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The object of the Association is to promote the preservation, by wise use, and the extension of the forests of the United States; its means are agitation and education; it seeks to encourage the application of forestry by private owners to forest holdings, large or small; and it favors, especially, the establishment and multiplication of National and State forests, to be administered in the highest interests of all.

The Association seeks as members all who sympathize with its object and methods, and who believe that our natural resources constitute a common heritage, to be used without abusing and administered for the common good. Seeking to conserve our supplies of wood and water, the Association appeals especially to wood-producers and users, including owners of wood lands, lumbermen, foresters, railroad men, and engineers; and to those dependent upon equable stream flow, as manufacturers, irrigators, employers of water power, and those engaged in internal commerce.

The Association meets annually in Washington. It publishes, monthly, FORESTRY AND IRRIGATION, the magazine of authority in its special field. The list of contributors to this publication includes practically all persons prominent in forest work in the United States, making it alone worth the cost of Annual Membership in the Association.

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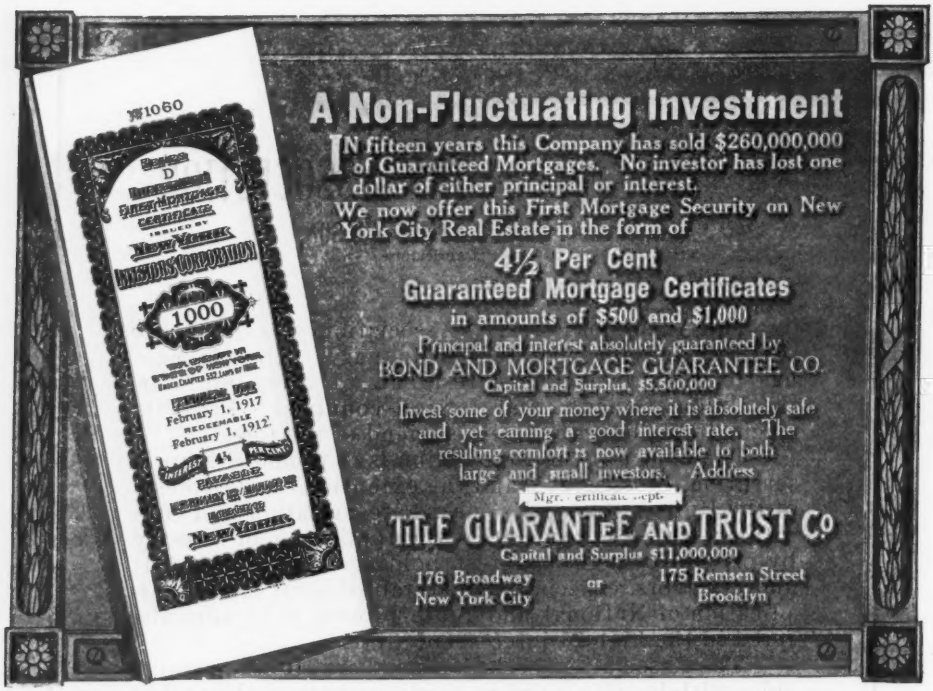

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CONTENTS FOR DECEMBER, 1907

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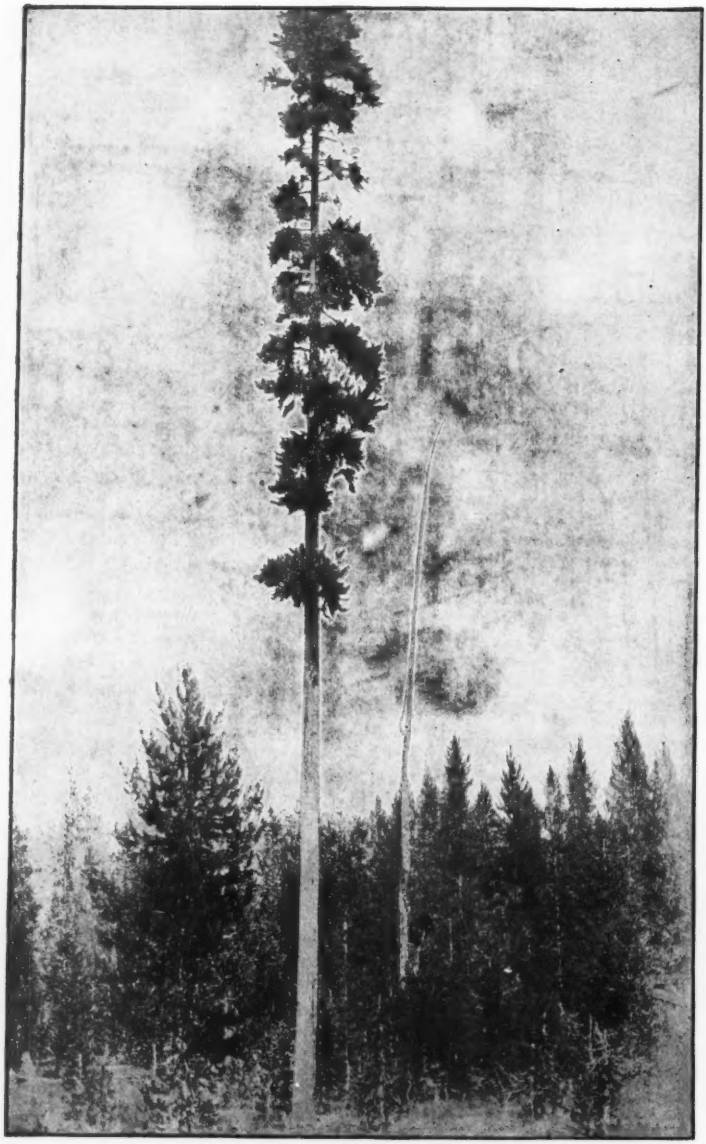


Ordinary mountain form of lodgepole pine

(See page 659)

VOL. XIII DECEMBER, 1907 No. 12

EDITORIAL

Saving Our Heritage

One of the most notable addresses of recent years was that of President Roosevelt at Memphis, on October 4th. It displayed a breadth of view and a statesmanlike grasp too rare in public men interested largely in the present moment, and oblivious to the fact that the life of a nation is measured not by years but by centuries and cycles.

Addressing the Waterways Convention, the President appropriately spoke first of the development and improvement of our inland waterways. The Mississippi and its tributaries, he declared, should be utilized to the utmost possibility. Cheap transportation is essential to modern industrial civilization. The railroads have shown that they alone can not meet the demands of the country for transportation. The rivers should be utilized. These natural highways can never be monopolized by any corporation. They belong to all the people. Navigable rivers paralleling railroads materially aid in regulating railroad rates. When the water rate sinks the land rate cannot be kept at an excessive height.

Yearly the transportation problem becomes more acute, and the time has come when all our rivers fit to serve as arteries of trade should be provided with adequate channels. The National Government should undertake this work. Elaborate expert examinat on and calculation of the proportion between cost and benefit should first be made. The fact should be recognized that such work is important not simply to the localities immediately benefitted, but to the public at large.

By way of comment it may be added that, in point of time, water transportation far preceded rail. It was provided by nature, while rail transportation was the work of man. River highways have rarely, while rail highways have, in the United States, been almost universally privately appropriated, and operated primarily for private profit rather than for the public service. The extent to which the decadence of our rivers has been due to railroad dread of river competition is an interesting inquiry. Like the city streets, the great public highways, and all our other publicly owned utilities, the rivers of the United States, as noted, are the property of all the people; as such, they are rightly objects of public concern, and should be raised to the highest point of efficiency, not for the aggrandizement of some but

for the benefit of all the people for all time.

Purity of Water Supply The President referred next to the problem of the "purity of waters used for the supply of towns and cities, the prevention of pollution by manufacturing and other industries, and the protection of drainage areas from soil wash through forest covering or judicious cultivation. With our constantly increasing population," he added, "this question becomes more and more pressing, because the health and safety of great bodies of citizens are directly involved."

The circulation of our products presents a striking picture. From field, forest, mine and pasture land myriads of tons and of dollars' worth of produced wealth are poured into our cities; here, a large percentage of them are consumed. There results, however, a huge residue of offal and rejected matter. This is poured into city sewers and, through these, into lakes and rivers, which are thus converted into the sewers of the nation. What does it mean? First, that elements which should have been returned to the soil for the latter's renewal are permanently diverted from that necessary use; second, that matter, vile, germ-laden and disease breeding, is dumped into the streams in which live our fish and from which our domestic animals and, in cases, our people themselves, receive their drinking water. The situation is ominous, revolting, dangerous.

The President's third point was the irrigation of arid lands, the prevention of floods, and the reclamation of swamps. With the first two the readers of FORESTRY AND IRRIGATION are familiar; the third is discussed elsewhere in this issue.

Water Power Waiting to be Used The development of water power was next touched upon. Its significance, the President said, in the development of our whole country and especially in the West, is but just beginning to be understood.

Economists, it may be added, have long since recognized the almost inconceivable potential energy represented by rivers, falls, and ocean currents and tides. Could but a fraction of this energy be transformed into electricity and applied to production, the heavy physical work of the world still remaining for men to perform would, we may well believe, appear petty. Interesting beginnings in the development and utilization of such power have been made. The writer has recently come into contact with some of them at Niagara Falls, Charlotte, N. C., Columbus, Ga., and elsewhere. The President refers to the plan of the city of Los Angeles to bring water for its use a distance of nearly 250 miles and produce water power sufficiently valuable to pay a large interest on an investment of over $23,000,000; and he suggests that water enough is flowing unused over Government dams built to improve navigation to produce many hundreds of thousands of horsepower. He adds that it has been computed that the annual value of the available but unused water power in the United States exceeds the annual value of the products of all our mines. Further, that "under judicious handling, the power of our streams may be made to pay for all the work required for the complete development and control of our inland waterways."

The President notes that the question of waterways is intimately related to a nexus of other vastly important questions, including the soil, the forests, the mines, and all the natural resources of the country. "Many of these resources which we have been in the habit of calling inexhaustible are being rapidly exhausted, or in certain regions have actually disappeared. Coal mines, oil and gas fields, and iron mines in important numbers are already worked out. The coal and oil measures which remain are passing rapidly, or have actually

passed, into the possession of great corporations, who acquire ominous power through an unchecked control of these prime necessities of modern life; a control without supervision of any kind. We are consuming our forests three times faster than they are being reproduced. Some of the richest timber lands of this continent have already been destroyed, and not replaced, and other vast areas are on the verge of destruction."

Fundamentals of National Life

The President next touches upon the question of our public domain, a National heritage inconceivably rich, but disappearing like our forests, game and mineral wealth. He says, "Our public lands, whose highest use is to supply homes for our people, have been and are still being taken in great quantities by large private owners, to whom home-making is at the very best but a secondary motive subordinate to the desire for profit. To allow the public lands to be worked by the tenants of rich men for the profit of the landlords, instead of by freeholders for the livelihood of their wives and children, is little less than a crime against our people and our institutions. It is clear beyond peradventure that our natural resources have been and are still being abused, that continued abuse will destroy them, and that we have at last reached the forks of the road. We are face to face with the great fact that the whole future of the Nation is directly at stake in the momentous decision that is forced upon us. Shall we continue the waste and destruction of our natural resources, or shall we conserve them? There is no other question of equal gravity now before the Nation."

Lastly, the President mentions the Panama Canal, that passage from ocean to ocean, that highway between North and South America, and between Occident and Orient, whose creation will live in history with that of the Pyramids of Egypt, the Acropolis of Athens, the Codes of Justinian and Napoleon, the printing press, steam engine, power loom, and cotton gin, and the utilization of electricity.

All of the interests mentioned by him the President groups into one magnificent whole, in the handling of which no petty question of party politics or partisan advantages should be permitted to enter. Altogether, these questions relate to fundamentals of our National life, to the conditions of our future greatness and pre-eminence, if not of our very existence.

Such observations are those of statesmanship. When National politics can rise to such a plane and continue there, the atmosphere will clear and the future of America will materially brighten.

Private Ownership in France

Though forest legislation took its rise in France as early as the sixteenth century, and though much has been done there to check the wasteful and disastrous methods of timber cutting common to most countries, the reforms effected have fallen far short of meeting the need. The November issue of the "Monthly Consular and Trade Reports" contains an article from Consular Clerk Milton B. Kirk, of Paris, showing the serious effects of deforestation in that country, and the fact that, to a large extent, the methods still continue which have wrought such ruin in the past. It appears from this report that the forests owned by the State—some 2,700,000 acres—are well guarded and cared for, while those in charge of departments and communes—3,472,000 acres—are not so well managed.

But these various public lands comprise only a little more than one-quarter of the forest area of France. The rest of this area is in private hands, and large tracts are often sold to speculators, who cut all the trees regardless of size, and then sell the land for grazing purposes.

Here is the same trouble found in America and other countries. Private ownership of natural resources is apt to lead to waste. Government forests are well cared for because the

managers are employees, whose interests are to give good service to the owners—that is, the people. The private forests are like mines, rich deposits which can be enjoyed by the present owner only by digging them out as fast as possible. This is because the owner is an individual; he is short-lived; he cannot wait eighty years for pines to grow; and his interest in the property is to have what other men have not, that he may trade advantageously with them.

The whole people, on the other hand, do not want the timber for trading, but for use. The French nation does not sell wood as a nation to other nations; but uses what it has by selling to its own members for utilization. They, as individuals, will trade with other individuals, at home and abroad; but the nation as a whole will conserve its woodlands in order that, as a whole, it may continue to draw upon them. The nation is not interested in those of its members who wish to trade in wood at this moment any more than in those who will not want it until next year or next generation.

Wilful Waste Makes Woful Want

By reason of the total clearing mentioned above, resinous woods in France are rapidly disappearing. The ash and the acacia are rarely to be found, while the poplar and the chestnut have nearly disappeared.

"Gaul, once the home of great oak forests, now has to seek other countries for the necessary supply of oak; and at present imports more than $7,000,000 worth, inferior to that once grown" on its own soil.

Without counting the imports of the more expensive woods, such as teak, mahogany, ebony, etc., France imported in 1906, from Sweden, Norway, Russia, Austria and Roumania, over $20,000,000 worth of pine lumber for building purposes, and $500,000 worth of mine props, which, together with timber used for paper making, footed up a grand total of $30,000,000. France now pays over $14,000,000 to foreign countries for the privilege of building her homes. Yet in the years 1905 and 1906 France exported $33,000,000 worth of wood products, and derives an annual revenue from her forests of about $3 an acre.

But these facts are by no means the most important ones connected with this method of treating forest lands. The denudation of the hill sides and mountain slopes has had other and more serious consequences in the shape of floods and droughts. These floods have not only swept away bridges and houses on low lands, but carried the soil of the mountains and hillsides with them, filling the streams and the harbors, and often ruining the valley farms over which they swept.

The experience of France is being repeated in this country. Already the effects of our wasteful and ruinous policy are felt, not only in the devastation resulting from increasing floods, but in the growing scarcity of timber to meet the demands of our rapidly increasing population. They are felt too, in the higher prices demanded for such lumber as is yet on the market, making it more and more difficult for the wage workers of the country to have homes of their own, or even to pay the rent of decent habitations.

Fortunately the people of the country show signs of waking up to a realizing sense of their peril. They are to be congratulated, too, on having a President who is thoroughly alive to the danger, and who is likely to do his best to preserve that portion of our heritage which is as yet unimpaired. It is to be hoped that the people of the whole country will follow up the recommendations sure to be made in his message, with such letters to their representatives in Congress as will secure the needed legislation.

The people must call for this legislation. The President's call is heeded by Congress, even contrary to its own judgment or wishes, if he has the people behind him; but without the popular feeling for a sounding board, the voice of even so august a person-

age as the President of the United States may be lost in the whirr of Congressional machinery.

The Way of Congress

Mr. Newlands, of Nevada, is neither Cicero nor Socrates, says the Louisville *Courier-Journal*, but when he said in his Memphis speech that persons outside of Congress must bring influence to bear to protect our natural resources, he drove a nail. Congress is responsive rather than aggressive in legislating for the good of the people.

This is true. Congress is not a director of public policy, but an agency of it. Government, in this country, is a cooperative company in which all the citizens are share-holders; but unlike commercial corporations, every member holds one share and has one vote. Members of Congress are agents of the people and, like agents in business, look to their principals for instructions. What the people of the country want, they have but to call for. If anything is wanted by some citizens and not by others, those who desire have but to persuade the others, and anything that is good will be accepted in time.

Industries Follow Raw Material

How industries follow the preservation and cultivation of forests may be seen in the fact that with the growth of the Government pine forests, woodpulp factories sprang up in Germany in large numbers, as well as factories for the manufacture of sash, doors, flooring, barrels, boxes, buttons and covers for musical instruments, and a great variety of other articles. Some 4,000 establishments, employing close to 60,000 people, have grown up in the mountain regions of Saxony alone, where prior to the growth of her pine forests, the country was comparatively non-productive.

Attention may be called to the fact that one hundred years ago Germany was suffering from a timber famine such as is now coming upon us. There was much agitation over the matter and the result was the establishment of the public forests in various German States, and the inauguration of careful forestry upon private estates. This was described in an article by Dr. Fernow, in the February issue of FORESTRY AND IRRIGATION.

The development of these wood working industries following a liberal supply of wood is similar to the experience of Cass Lake, Minnesota, near which place a National Forest has been located, against the opposition of the neighboring inhabitants. A crate and box board factory has since been started at Cass Lake because of the presence of the National Forest with its permanent supply of wood. The people of the village naturally take pleasure in this new industry with all that it means. This was described at length in the Forest Service Department of the August issue of the magazine.

Raw materials are the first essential to all factories. How important then to secure a sufficient supply of raw material in the way of wood, when so many of our manufacturing industries use this as the substance from which they make their products.

Manufacturers Should Bestir Themselves

It is pointed out on another page, in an article by Ernest Bruncken, that manufacturing companies are addressing themselves to the task of conserving private forests to supply each factory with its own raw material. Others continue to depend upon the general supply in the market; and yet, strange to say, take no interest in the movement for the conservation of all forests!

What is the explanation? Are they rash, trusting to luck? Or are they so blind in sticking to old habits, the business ways to which they have been trained, that they cannot see the necessity for change? This is the attitude of the Chinese; they reverence the ways of their ancestors, who for ages lived and thrived, leading lives of intelligence and moral worth. The modern Chinese think it strange that

they cannot by following the old paths, attain the old prosperity. Yet even the Chinese now recognize that they suffer, where their ancestors did not, from lack of forests. A school for training foresters has been established and the Chinese intend to remedy their trouble. In this school of forestry China has what many States of the American Union have not.

A third reason may explain the indifference of some manufacturers to forestry. They know the need and expect it to be met; but they leave it to others. They know that some people will have patriotic spirit, even if they have not. They say they cannot afford to pay out anything for this purpose, though their business will go to ruin if nothing is done—they cannot afford to, because they know that others will bear the expense. Others will spend their money to save their country; but these people will wait until the work is done; then they will enjoy the benefit, and say approvingly, "That was good work, that was a good thing to do."

Sponges, cease from sponging. Be men; do your part. Your country needs your services. Join in the forestry work.

Russian Mulberry

An article on another page shows how well **Russian mulberry grows** in a good situation, even with the limited rainfall of the Plains region. This brief sketch with its three illustrations, accentuates four points: (1) Mulberry keenly appreciates moist, rich soil; (2) it is peculiarly suited for windbreak purposes; (3) cuttings for posts can be made from windbreaks every few years without seriously impairing their protective value; (4) as soon as leaf litter forms beneath the trees and birds congregate, abundant reproduction from seed may be expected.

American Wastefulness

The New York *Tribune* states that the waste of trees, of coal and of mineral ores is, after all, trifling in comparison with the total results of the petty day to day wastefulness of seventy million Americans. The Tribune "says seventy million Americans, because there are a few million natives and perhaps ten million newly landed immigrants with whom sane economy is a deep and controlling habit. Economy is an art which men acquire, as a rule, only through compulsion, and which, if not mastered in early years, is rarely learned."

Nevertheless, economy is a virtue and, like other virtues, people should seek to acquire it. Because we have plenty is no reason why part should be squandered. Abundance of resources merely gives their fortunate possessor opportunity to do more good work and to dispense more blessings in the world. Such a person should be like the ant in the fable: "I always find something or other to do, if not for myself, for my neighbor."

Philippine Forest Resources

According to the report of the Forestry Department in the Philippines there are in the islands 40,000 square miles of valuable timber land covered mainly with pine. Some day the people of the United States may be enabled to benefit by reason of this colonial lumber supply. To prevent speculative operations the Philippine Government limits the holding of any single owner to 2,500 acres, but this limitation was made too late to head off several early adventurers after the American occupation. Yet, after all, it must be remembered that the Philippine forests, like the rest of that country, belong primarily to the Filipino people. The tariffs, laws, and administration of the Islands must be for the benefit of the people who live there. If Americans should go in there and strip these forests, it would be robbery.

Judge Taft was right when he said that Americans in those Islands who did not like the principle of the Philippines for the Filipinos ought to try America for the Americans.

NEWS AND NOTES

A Lecture Tour in the North

Dr. Thomas E. Will, secretary of the American Forestry Association, is still engaged in lecturing. Following the tour in the Southeastern States noted in our November issue, he started upon a tour of the Northern Mississippi and Lake States, principally in Wisconsin and Michigan. Two meetings were held at Madison, one before the Science Club of that place. At Wausau five or six hundred of the most substantial citizens were present. At Milwaukee likewise several hundred business men were in attendance. At Grand Rapids, Michigan, the public library had the meeting in charge; at Muskegon, one of the churches. At Ypsilanti a lecture was delivered before the State Normal School, to an audience numbering about a thousand. At Detroit the Turnverein took care of the meeting. The enthusiasm of Germans for the forests is notable, and Detroit showed no exception. At various other points enthusiastic meetings were held, while Toledo, Columbus, Paducah, and Parkersburg are yet to come, at the time these lines are written.

The newspapers all along the line are taking hold of the matter in the same way as those in the South, that is, vigorously and with full sympathy. These Northern States have drawn so much of their prosperity from the lumber interests that anything affecting the woods interests them keenly.

Blind Mouths

This is the striking title of an editorial in the *Century Magazine* on the fatuous destruction of American forests. It suggests that the administration of the National Forests toward the settlers is too liberal rather than too harsh; and protests against the invasion of the Yosemite National Park to procure water for the San Francisco city supply, which can be obtained otherwise. In regard to the East, the article proposes the reservation of the higher altitudes of the whole Appalachian range. Referring to the ravages in New Hampshire and West Virginia, it reverses the famous witticism and asks, What has posterity ever done to us that we should do such things to posterity?

Place the Blame Where It Belongs

The President has signed the proclamation which adds over 400,000 acres to the National Forest reserves in California, and although this may seem considerable, it is actually small compared with what is needed in the way of National reserves in order to keep the balance of timber within the limits of proper perpetuation. Considering this situation the New York *World* remarks that "lumbermen who see their future profits through forest spoliation cut off will place the blame where it belongs."

"And appreciative citizens who do not like the prospect of a famine in timber can approve, if they will," adds the Bridgeport (Conn.) *Standard,* "what has been done and is still being done, to prevent it."

Science and Statesmanship

In the *Journal,* Jamestown, N. Y., we find this comparison: "Within a decade the United States will have under way upon the part of States and the Nation combined, just as definite a policy of forest reservation, preservation, and development as prevails in Germany. The world owes much to those Prussian scientists, who, working in a new field and amidst the discouraging atmosphere of a critical public, originated and initiated in application the modern science of forestry.

"It is for men like Pinchot and Roosevelt to apply those principles as a matter worthy of the highest form of statesmanship. Here and there mav

be a blunder, now and then some injustice may be done to an individual or a section, but as a whole the policy initiated by Roosevelt will bear the test of time."

Sign of a New Conception An observing visitor to any railway station in Massachusetts now finds posted there, as one of several centers of popular resort, a poster just issued by the State Forester setting forth the provisions of the new law which establishes town officials, whose permit must be had for setting any necessary fires in woodlands, and who are held responsible for fighting all fires started by railways, by hunters, or by careless or malicious persons. The law gives these officials power to enlist citizens, their horses, their wagons, and anything they may have which will be serviceable at a time of peril from fire, and it imposes penalties for the refusal of individuals to co-operate with the fire wardens. This is a practical way, comments the Boston *Herald,* of aiding in saving such timber as Massachusetts possesses, and it is only one of many signs that a new conception of forest values has come and come to stay. It needs to be supplemented by positive plans for development of lands now unplanted and for an increase of acreage of timber.

A Notable Interview "It can do no harm," says the Springfield *Republican,* "for Mr. Pinchot to tell the public every little while that 'in twenty years the timber supply in the United States on Government reserves and private holdings, at the present rate of cutting, will be exhausted.' There cannot be too much agitation of the question of the forests."

The statement referred to was widely published in the press of the country. It was made by Mr. Pinchot in an interview upon his return from the West last month, from a trip of inspection of the National Forests, in which he traveled five thousand miles. He urges that the danger of the situation should not be underestimated, as it is liable to be by hopeful people. Hopefulness is good, but precaution is needed. In fact the utmost that precaution can do is to lighten the trouble which must be undergone. The Forest Service will ask Congress for money to extend the service and to push the work of reforesting lands which are denuded.

Sentiment is Changing In speaking of the protection of the natural resources, Mr. Pinchot said that there is a changing sentiment throughout the country, and that the people are beginning to see that the right to use such resources does not carry with it the right to destroy them.

Owners Held Responsible A scheme advocated by the State Forester of California is being watched with a great deal of interest. Under the police powers of the State the Forester is endeavoring to protect the watersheds and prevent private owners from devastating these lands in such manner as will injure irrigation of lands below. If this plan works well, it is likely to be taken up in other States, and the Federal authorities will be aided greatly by the co-operation.

Pays to Hold Woodland Mr. Pinchot produced figures to show that at the present increase in the value of timber land the owners of such land are making more money by letting the timber develop than they would by cutting it, marketing it, and putting out the proceeds at interest.

In the Republic of Colombia The world-wide movement for protecting forests and developing them has reached South America. The Republic of Colombia has promulgated a decree regulating the use of its national forests, and a translation has been sent to the United States by Consul I. A. Manning, of Cartagena.

It has been customary to consider the forests of the central and northern portions of South America (as the forests of North America were once considered) inexhaustible. It has been clearly shown that North America's woods were not inexhaustible, and it appears that the business men of South America are convinced that theirs are not, and measures have been taken to protect them. Colombia has entered upon a forest policy while it yet has plenty timber. By using it wisely it will always have plenty. It it taking the "stitch in time."

Contractors who cut cedar and mahogany from public lands in that country are required to plant young trees of the same species in the cut-over spaces. Lumbering and planting must be carried on side by side.

The Forest Produces Yet Lives

Much care is given to the valuable rubber tree in the southern republic. In Colombia's national forests the rubber gatherer is required to give the tree periods of rest, when he must bind up the wound with wax or clay to exclude the air and prevent the wood from drying. The size of the incisions, and their location and number, are regulated by law. The tree is thus given a chance for its life; and the forest produces, yet lives.

The Colombia regulations prohibit the cutting of immature trees for lumber. They must be ripe for the harvest. The saplings and sprouts, which will become trees, are carefully protected. The ivory-palm, the fruit of which furnishes vegetable ivory, must not be cut under any circumstances, nor must immature fruit be gathered. The value of this tree is in its fruit, not its wood.

Colombia has several species of trees chiefly valuable for the bark they produce. Peeling bark from standing trees is prohibited. This prevents waste. The tree's whole bark must be taken, or none. The Colombia government does not propose that bark peelers in its forests shall take a little of the choicest bark and leave the rest to decay, even though there be plenty more at present.

Save While They Enjoy

Forest resources in Colombia are great. The Magdalena and several smaller rivers penetrate the timbered regions and provide hundreds of miles of navigable waters through primeval forests which cover thousands of square miles. With the rapid exhaustion of timber in regions whence the world's supply has been coming, lumbermen are turning their eyes toward the forests of South America.

The Republic of Colombia understands the situation and seems to be proceeding upon the homely but excellent maxim, "Be saving while there's plenty."

How Prominent Men Endure Jail

The Helena, Montana, correspondent of the Indianapolis *News* tells how some of the "big men" are faring nowadays at the hands of the U. S. Courts.

"Wealth and position are not standing in the way of the conviction of the men who have been violating the law by misusing the public domain here. The punishment assessed for illegal fencing is usually a fine of $1,000 and one day in jail.

"Recently some of the Eastern newspapers have been criticising the one day jail sentence, calling it a farce; and only the other day the Department of Justice asked the district attorney for an explanation. U. S. Attorney Rasch, who is making an excellent record in running down the law breakers, defends the one day sentence. The moral effect, he says, is as good as three months in jail. Recently another 'prominent citizen' was convicted and fined the usual amount and sentenced to one day in jail. He took his sentence with good grace and went to jail with head erect and shoulders thrown back. The next day

when he came out, to use an expression of one of his friends, he looked like a rooster that had been in a fight and had been worsted. Some one remarked to him that he seemed to be taking it rather hard.

"'Yes, I am,' he said; 'I stood it all right until about midnight, when I received a telegram from an old political enemy at Butte, asking me to be sure and make him a hair brush.'

"Prisoners who serve any considerable length of time are put to work making hair brushes. From all accounts the one day sentence is humiliating to the 'prominent citizen' and one may rest assured that it does not soften his feelings toward the administration's forest reserve and land policies."

The Epic of the Pines

The Chicago *Inter-Ocean* declares that the sweeping away of the American pine has been an epic performance from its opening in the Maine woods, through its great second act that took the pines of Michigan, Wisconsin and Minnesota, to its final attack upon the woods of the Pacific Northwest. Legions of men, virtually well organized armies,it is pointed out, have engaged in conquering the pine forests with the ax, while the destruction of hardwood forests has been left for the most part to the smaller lumber interests and the settler who makes clearings.

Lumbermen's Change of Heart

Happily, the lumbermen, who have slaughtered the trees so recklessly in the past, are now, like other intelligent men, seeing the necessity of greater care. The Watertown, N. Y., correspondent of the *Paper Mill* comments thus on Secretary Wilson's prophecy regarding the timber famine:

"It fails utterly, according to the belief of the trade in this region, to take account of the growing sentiment among lumbermen, paper and pulp operators, etc., to preserve their sources of supply. The vicious old system of cutting, recutting and then burning over, which nobody will deny was the universal idea some twenty-five or thirty years ago, is practically abandoned, at least in this section. You will go far nowadays and find no operators who are pursuing this course; and in the cases of those who do, they are usually very small operators whose depredations cut little figure in the big scheme as generally considered."

Paper Men Growing Wood

The practice is coming into vogue of manufacturers securing their supply of timber by caring for own forests, and an example of this is seen in the Remington-Martin Paper Company, of Watertown, who are not only cutting their timber sparingly but are preparing to reforest stretches from which spruce has already been cut. They are planning nothing less than to reforest all the lands on which cutting has been conducted since the company bought these tracts several years ago. The plan also includes restoring some portions denuded before the company bought these lands.

Two other prominent paper companies in the same region, says *The Paper Mill,* namely the Dexter Sulphite and the Gould Paper Companies, are actively engaged in reforestation, and others are preparing to follow their lead.

How Will We Do Without Pine

The position which the United States has held as a lumber-producing nation has, perhaps, been due more to white pine than to any other wood. The timber of this valuable tree, which has played a most important part in the material development of the Nation, is fast disappearing and now it is as costly as the finest American hardwoods.

Rev. Edward Everett Hale, the chaplain of the Senate, who has always taken an interest in forestry, deplores the passing of white pine as our foremost wood, and tells how in his own lifetime he has seen the day when

"the masts of every vessel that sailed the Seven Seas were made from New England grown pine; while to-day very little white pine is cut in New England big enough to furnish a good-sized spar." He tells also, to illustrate the increasing cost of the wood, that he ordered a set of book shelves on which the cabinet-maker first made a price, and then asked whether they should be of mahogany or white pine. The pine was as costly as the mahogany!

The best stands of this timber now in this country are in scattered sections in Minnesota, New England, and parts of Idaho. The species known as white pine in Idaho is sometimes called silver pine. Some of the country's best white pine is found on the Indian reservations in Minnesota and Wisconsin and scattered stands are found in the States of Wyoming, Montana, Colorado, and one or two other States. At the present rate of cutting the tree will soon be practically a thing of the past. The small stands in the National Forests are inconsiderable, but they will be managed with the greatest conservatism by the Government through the Forest Service, and through this method and practice of reforestation it may be hoped that the fine old tree will furnish timber for other generations.

Few Look Beyond the Doorstep

The Washington *Post* discusses with earnestness the way our forests have been treated. It says it has been the hardest kind of a task to make the people understand there is sharp danger that they are to lose their timber supply.

"Warnings have been scoffed at every time that they have been posted. Few people look beyond the doorstep, and they associate an abundance of carefully planted and tended shade trees with a forest crop great beyond the harvesting.

"Possibly heredity has something to do with it. The pioneers of America looked on the trees as enemies that must be overcome before the cabin could be built and the clearing made for the putting in of the crop. The pioneer who spent the better part of a day felling a tough forest giant never could be made to believe that the day would come when trees would be scarce in the land. Something of the pioneers' feeling must have been transmitted, for private land owners and the great lumber companies have worked ax and saw as if forests sprang anew in a night.

"Not long ago one of the Forest Service officials wrote of a great timber district: 'A clean lumber job is seldom seen.' It has been the rule to fell trees without regard for the young growth; to get one big tree ten little trees have been killed. Logs have been dragged out with mule teams to the annihilation of seedlings, and tree tops and small branches have been left to rot, to become the breeding places of insects which attack the still struggling growth.

"The always-ready answer to remonstrance against destructive lumbering methods has been: 'Don't worry; the trees will grow again.' The hard truth is that on the mountains, the great source of timber supply, the trees won't grow again. When the mountains are denuded the rains wash the soil away, and as the soil is thin at best there soon is nothing left to give either life or roothold to the tree. With the mountain forests gone, floods and droughts succeed each other, and there is no even distribution of the rainfall. Silt is carried down to obstruct navigable rivers, and factories dependent on water power are idle days at a time.

"The men who first gave warning of a danger of a famine in forests were called sentimentalists, and they were put in a class with those who said that the buffalo, the wild pigeon, and the songbirds would disappear if their slaughter were not checked by law. Occasionally there is hard sense in sentiment. The sentimentalists could not save the buffalo and the

pigeon, but they did save the songbirds, though to do it they had to back sentiment with some drastic legislation.

"There is to be a conference in Washington before long having for its end the finding of means to conserve the natural resources of the country. If sound legislation can be formulated to save the forests it should have the quick attention of Congress. A lumber famine is not a pleasant thing for a people to confront."

Propaganda Work Appreciated In a half-column editorial entitled, "Forest Conservation," the Brooklyn *Daily Times* says:

"It is well that there are those who, looking beyond the exigencies of the moment, have seen the necessity for conserving the forest resources of the country. Only lately has this necessity dawned upon the public conscience, or upon that part of it which leads the greater part in the formulating of National policies. The Bureau of Forestry of the Department of Agriculture is doing a growing work in giving instruction and help to all willing to lend a hand in helping forest growth, and the American Forestry Association is sending forth announcements to stimulate public interest and to bring about a real-depleting of our big forests."

The Forestry Association should receive the adhesion of all those who appreciate the seriousness of the danger threatening American industry and home comfort.

Pennsylvania State College Professor Baker, in charge of the forestry work at Pennsylvania State Agricultural College, has sent in a number of new memberships of forestry students. A forestry club has just been organized in the college, with eighteen active members. The work of the department is starting out nicely, with a larger number of students than expected in the regular four year course. In connection with the agricultural short courses for working farmers, during the winter, a series of lectures on farm forestry will be given.

With a large variety of tree species all about the college, and with a State reserve near by, there is opportunity for practical observation. The students will spend a month in the woods at the end of the sophomore year.

Three Hundred Students The students of the University of Nebraska have organized a forestry club which meets twice a month. The forestry work in this University has attracted an enthusiastic lot of students. There are forty-seven registered in the regular courses and about three hundred will take the special course in farm forestry which is given to all agricultural students.

Professor Bogue's Decease Prof. E. E. Bogue, head of the department of forestry in the Michigan Agricultural College, has finished his work. His decease took place August 19th. Professor Bogue had a high standing as a botanist, as a forester, and as a public man. His influence contributed much to the present activity of the State Government in the direction of preserving the forests. His successor in the college is Prof. J. Fred. Baker.

Miners Object to Filling Rivers The River Improvement and Drainage Association held a meeting in San Francisco with the U. S. Senators and Representatives from that State, on November 11th. Among the addresses at this meeting was one by State Mineralogist Lewis E. Aubury, upon preservation of the forests, and their relation to rivers and harbors, from which we quote:

"Possibly some of the miners' old time antagonists from the valleys will appear before you and again bring up the old debris problem, and tell you of the damage which has been inflicted upon them from the operations of

placer and hydraulic mining, and from the gold dredges. I hope, however, that the hatchet which has for some time been buried between us, will not be dug up again. Let us all work together for the common good of California.

"But aside from the *mining* debris problem—While we must seek to improve our waterways by artificial means, in my opinion, we must also form some plan which will prevent, as far as possible, the continuation of the regular flow of debris of all character into our rivers. The amount of debris which is annually deposited in our rivers, arising from natural erosion, is at the present time impossible of estimation.

"The Government, I have been informed, has just commenced to establish stations to determine what the natural erosion amounts to. Until a report is made on the subject, it would be useless to endeavor to estimate it.

"But back of all this, the true solution of debris deposition lies in the protection of our forested areas. With the mountains well covered with timber, the trees will act as the best resistant to erosion. With our forests burned or cut away, nothing is left to protect the soil from the heavy rainfalls, and the consequent deposit of these soils in our rivers.

"This side of the question has probably not received the consideration which it merits. Natural erosion has scarcely been considered, and when our waterways have been filling with debris, one cause only has been attributed, and the blame for all of it has been laid at the feet of the miner. Now, in asking Congress for aid in preserving our waterways, we wish to say that the miners are very much interested in the subject, and we will lend our aid in settling this much vexed question.

"Personally, it is my belief that in the settlement of it, Congress should also make a liberal appropriation to the Forest Service, for with our 21,000,000 acres of land in the Forest Reserves of California, I believe it to be imperative that these reserves should have a sufficient amount expended upon them to insure the best administration. Protect our forests, and the difficulties which we have encountered in the proper protection of our waterways will be minimized."

National Drainage Convention

The National Drainage Association holds its annual convention in Baltimore as we are going to press, on November 25th to 28th. Many eminent men will be in attendance. Congressman Steenerson of Minnesota will speak on drainage as a commercial asset to the United States; and Mr. Robt. E. Lee of Baltimore, on drainage from the labor standpoint. There will be several addresses relating to sanitation, mosquitos, and the swamps infested by these insects, one being by Henry Clay Weeks, the secretary of the Mosquito Extermination Society. Mr. Pinchot will talk on the forests in their relation to drainage; and Mr. Newell on the drainage work of the Reclamation Service. Senator Newlands, Ex-Senator Marion Butler, Congressmen Bede and Small, Secretaries Garfield and Bonaparte, and other prominent persons will take part in the program.

The Bill Before Congress

At the last session of Congress Senator Flint of California, who is to address this convention, introduced a bill under which the proceeds from sales of public lands in the States containing swamps are to be set aside for a drainage fund to be expended under the direction of the Secretary of the Interior. The bill was favorably reported by the public lands committee but got no further. Effort in its behalf will be made at the coming session. It is claimed that more land is available for reclamation by drainage than by irrigation, and nearer to large markets.

In the Reclamation Service department of this magazine will be found some of the arguments advanced by the Drainage Association.

Coal Fields in Alaska

Coal is found in Alaska, both on the islands and in the interior. The Geological Survey has been making a survey of these fields. Coal has been mined at more than a dozen places along the Yukon, and at some of these places the mining has been profitable; but no extensive development of the coal fields in the interior has been undertaken and no work was being done on the coal claims of this region during the past summer. There are good propects of early development of the coal fields in the coastal provinces west of Mount St. Elias, and it is probable that Alaskan coal will soon be shipped regularly to many ports on the Pacific coast.

If the course which is being urged on the Government, of withholding Government coal lands from private acquisition and only leasing them for development, should be carried out, it would doubtless result in greater benefits from these Alaskan fields to the people of that territory and the Pacific Coast. In the older parts of the country coal is mined by methods which leave half or more of the coal in the ground, and when operations cease and the props which hold up the roof of the mine are removed, the earth above caves in and the coal remaining can never be obtained. One object of Government ownership of coal mines, which is urged by many practical persons, is to secure more efficient and economical methods of mining.

The Freezing of Wells

Throughout many of the Northern States the freezing of wells and pumps causes much trouble, and the greatest difficulty is experienced in keeping some wells open for use during the winter. Strangely enough, the shallow, open wells give less trouble than the deeper, drilled or double-tubed driven wells, in which the inner or pump tube is carried below the outer casing. The determination of the cause of the freezing and of means for its prevention is of so great practical importance that a study of the subject has been made by one of the geologists of the United States Geological Survey.

A study of the phenomena as a whole shows that they are closely connected with barometric changes. Suggestions for controlling the difficulty are made by the geologist.

Waterpower Investigations in Maine

An engineering expedition representing the State and Federal Governments has been engaged in securing data on the lakes and rivers of Maine, with a view to conserving the water-powers. It is desired to know what amount of water properly collected in reservoirs will maintain a given amount of power in dry seasons. On the Penobscot River, for instance, in very dry times there is only enough water to turn three per cent of the mill wheels that might be employed if the total stream flow were properly distributed through the year.

Maine's Timber Output

The log drives of all the Maine rivers are now in the booms, says the Bangor *News*. The drives have been especially clean this year, no logs being left to winter in the streams and brooks. This, of course, has been due to the high water which has continued through the summer.

It is roughly estimated that last winter's cut in Maine was about 800,000,000 feet of spruce and perhaps 100,000,000 feet of pine, most of the latter being in the southwestern part of the State, where a second growth of pine has now developed along the Saco in place of those first great pines, which gave Maine the name of the Pine Tree State. In the old times lumbering was strictly a winter busi-

ness; now, however, most of the cutting is done in the fall, being finished by New Year.

Many thousand fire notices were posted on trees in all the resort regions last summer; and the diligent efforts made to prevent and extinguish fires, aided by the wet summer, have made the record of the State in this respect beter than for many years.

New Jersey State Forests Mr. H. Chew has resigned his position as Secretary of the Forest Park Reservation Commission of New Jersey and Alfred Gaskill, present State Forester, has been appointed in his stead.

The Blairston tract, in Warren County, was not acquired as a State forest reservation because of defective title; but a new tract known as the Culver Reserve, in Sussex County, has been secured.

A small addition has been made to the Bass River Reservation in Burlington County of eighty-three acres, making the total area of that reservation 1,633 acres.

The May's Landing Reservation, in Atlantic County, has an area of 373 acres and the Culver Reservation 5,432 acres, making a total of 7,438 acres at present set apart in New Jersey for State Forest purposes.

A Nearer Mountain Resort Wanted The Nebraska Park and Forest Association is urging that the Wet Mountain Valley Reserve be transformed into a park which will make a mountain vacation retreat for the great prairie States of Kansas, Nebraska, Missouri and Iowa. They ask for $500,000 to be appropriated for roads and other conveniences for visitors. The people of the prairies are more and more impressed with the need of vacation, but the usual rates and routes are too expensive for many of them. It is claimed that the accessibility of this part to the well-peopled farming States west of the Mississippi River would cause it to be visited by thousands of persons where hundreds go to Yellowstone Park, for instance, where the distance is so much greater.

Activity Reported in Mexico The Wall Street *Journal* reports activity in Mexico:

The North American Industrial Co., which acquired 150,000 acres of longleaf pine in the State of Jalisco, in the Sierra Madre region, is said to have purchased an adjoining timber tract of 135,000 acres. The company plans to establish a large turpentine industry. Saw mills will also be erected and the timber utilized for railroad ties and commercial lumber. W. G. Burchfield, of New York, is president.

The Sierra Madre Land & Lumber Co. is perfecting plans for care of its enormous output of lumber when its two large mills are in operation. The first, at Madera, will be turning out 250,000 feet per day by January 1, and the other, of equal capacity, about February 1. Large yards are to be established at Chihuahua, Cananea, Parral and other cities of Mexico, and at El Paso, Texas; Douglas, Arizona; and other places in the Southwest. The company is already doing a good business supplying the lumber market of Northern Mexico.

James Leroy, formerly United States consul at Durango, acquired a large tract of timber land in that State. He will establish saw mills and manufacture commercial lumber.

A. S. Rico, of Cincinnati, and associates, comprising the Casas Grandes Lumber Co., who own 180,000 acres of fine timber land in the State of Chihuahua, are preparing to install two saw mills, each of a capacity of 60,000 feet per day. One will be on the timber tract and the other at El Paso. The company also owns two new mills, each of 20,000 feet daily capacity, at Casas Grandes. Construction will soon be commenced of a 30-mile railroad from Casas Grandes to the timber tract. It is planned ultimately to extend this to Colonia Pacheco, where a large Mormon colony is located.

In South Africa

This office recently had a call from Mr. Bertram D'Alton, of the Forest Department of South Africa. Mr. D'Alton says forest conservation and extension is given large attention there. It is necessary, for the southern country is lacking in timber. Further north in the interior there are large forests, but these are not available on account of their distance and the lack of transportation facilities.

Jap Colony in Georgia

The paper called *Georgia* reports that a Japanese colony is expected in the State of that name, to settle in Brunswick. There will be twenty to twenty-five men in the party, and they will be put to work immediately after arrival on one of the rice plantations on the Altamaha.

The first year will be a test for the movement, and if it is successful other Japanese will come in the summer of 1908.

It is believed that they will make a success of rice culture in that section, since the system followed is more like that of their native country than the system in vogue in Texas and Louisiana, where all the fields are irrigated.

Once it is demonstrated that the workers can do well there, an abundant supply of labor will be provided for the rice fields of the Georgia coast.

Waste of Artesian Waters

Millions of gallons of artesian waters are going to waste every day in Indiana. Over a million gallons a day are wasted in a single county, each well pouring out five to twenty gallons of water a minute. The amount thus lost in Madison County alone would supply a city of 10,000 inhabitants. In only a few places is this water put to use. The farmers do not seem to realize that a hydraulic ram or a windmill placed on a flowing well will raise a large portion of the water to their houses on the hills above.

In this way the height of the water in the wells has been lowered several feet. Many wells that once yielded copious and strong flows have ceased to flow entirely. By this means, also, the ground-water level in this region in ten years has been lowered over ten feet.

The conservation of the artesian water supply should not be very difficult. By simply capping unused wells, or by providing them with such means of stopping and controlling their flow as is now applied to ordinary municipal supplies, the head of the wells can be preserved and the height of ground water maintained somewhat near to its old level. Legislation may be required to accomplish this result.

Plant Trees on Rocky Hills

The State Forester of California reports that he has an unusually large number of inquiries regarding the proper methods for planting forest lands. Lumber companies, land corporations and private individuals are showing keen interest in the possibilities of profit in growing timber, and are asking advice as to the best way to go about it.

There has been an astonishing neglect of opportunities lying at the door of a great number of landowners in the State. There is a vast acreage of land in California that is useless for raising cultivated crops, and of small value for pasture. The coast counties are covered by hills and mountains, steep, rocky, and showing but scanty vegetation. Yet, it has been proved at hundreds of points that these lands will grow different varieties of trees—especially eucalyptus—that will in a few years from planting produce valuable timber.

THE PRESIDENT CALLS CONFERENCE ON NATURAL RESOURCES

A FRESH move by President Roosevelt in the effort to maintain the ultimate basis of American prosperity is made in an invitation to the Governors of all the States and Territories to come with citizens appointed by them and meet at the White House next May to consider how the natural resources of the country shall be used and conserved.

The reasons for the action are given in the invitation, which was made on November 11th. Mr. Roosevelt declares again that there is no other question of equal gravity before the Nation. The text of the letter is as follows:

"Dear Governor: The natural resources of the territory of the United States were, at the time of settlement, richer, more varied, and more available than those of any other equal area on the surface of the earth. The development of these resources has given us, for more than a century, a rate of increase in population and wealth undreamed of by the men who founded our Government and without parallel in history.

"It is obvious that the prosperity which we now enjoy rests directly upon these resources. It is equally obvious that the vigor and success which we desire and foresee for this Nation in the future must have this as its ultimate material basis.

"In view of these evident facts, it seems to me time for the country to take account of its natural resources, and to inquire how long they are likely to last. We are prosperous now. We should not forget that it will be just as important to our descendants to be prosperous in their time as it is to us to be prosperous in our time.

"Recently I expressed the opinion that there is no other question now before the Nation of equal gravity with the question of the conservation of our natural resources, and I added that it is the plain duty of those of us who, for the moment, are responsible, to make inventory of the natural resources which have been handed down to us, to forecast as well as we may the needs of the future, and so to handle the great sources of our prosperity as not to destroy in advance all hope of the prosperity of our descendants.

"It is evident that the abundant natural resources on which the welfare of this Nation rests are becoming depleted, and in not a few cases already exhausted. This is true of all portions of the United States. It is especially true of the longer settled communities of the East. The gravity of the situation must, I believe, appeal with special force to the Governors of the States, because of their close relations with the people and their responsibility for the welfare of their communities. I have, therefore, decided, in accordance with the suggestions of the Inland Waterways Commission, to ask the Governors of the States and Territories to meet at the White House on May 13, 14, and 15, to confer with the President and with each other upon the conservation of natural resources.

"It gives me great pleasure to invite you to take part in this conference. I should be glad to have you select three citizens to accompany you, and to attend the conference as your assistants and advisors. I shall also invite the Senators and Representatives of the Sixtieth Congress to be present at the sessions as far as their duties will permit.

"The matters to be considered at this conference are not confined to any region or group of States, but are of vital concern to the Nation as a whole and to all the people. These subjects include the use and conser-

vation of the mineral resources, the resources of the land, and the resources of the waters in every part of our territory.

"In order to open discussion, I shall invite a few recognized authorities to present brief descriptions of actual facts and conditions, without argument, leaving the conference to deal with each topic as it may elect. The members of the Inland Waterways Commission will be present, in order to share with me the benefit of information and suggestion, and, if desired, to set forth their provisional plans and conclusions.

"Facts, which I cannot gainsay, force me to believe that the conservation of our natural resources is the most weighty question now before the people of the United States. If this be so, the proposed conference, which is the first of its kind, will be among the most important gatherings in our history in its effect upon the welfare of all our people.

"I earnestly hope, my dear Governor, that you will find it possible to be present."

LUMBERING POSSIBILITIES, AGUSAN VALLEY, PHILIPPINE ISLANDS

MR. W. I. HUTCHINSON, of the Philippine Bureau of Forestry, has lately investigated the stand of timber in the Agusan Valley, Agusan Province, Mindanao, in order to determine the possibilities of carrying on extensive lumbering operations in that region.

The area examined lies to the east of the Agusan River, which is one of the great streams of Mindanao, and extends from the Tagabaca River a hundred miles or more up the Agusan to the Gibong River, one of its large tributaries. The width of the tract, from the Agusan eastward to the Pacific Coast range, is estimated to be twenty miles; the total approximate area being 2,000 square miles, or 1,200,000 acres.

A rough map was made of the area, and a large number of valuation surveys taken, from which it will be possible to obtain reliable figures on the stand of trees of different species, per hectare, in the various forest types of the valley.

The entire Agusan Valley, with the exception of a few small hills, and and the extensive swamp area between the towns of Talacogon and Veruela, is agricultural land. On account of transportation difficulties, travel being performed almost exclusively by baroto, very few Americans have ever explored the valley. Naturally but little is known of the agricultural possibilities of this region, which will without doubt, in the near future, be one of the greatest hemp-producing districts of the Philippine Islands.

The soil of the valley is an alluvial clay-loam, compact, deep, and fertile. The subsoil is sandy loam, or pure sand. There are no rock outcrops, except in the few scattered hills.

The rainfall of the region is abundant, ranging from eighty to one hundred or more inches per year, at Butuan. Although figures are not available, the precipitation in the upriver valley is undoubtedly greatly in excess of this amount, as heavy show-

ers, which do not reach Butuan, occur there almost every afternoon during the dry season.

The inhabitants of the Agusan Valley are, for the most part, Christianized Manobos, a branch of the Malay race closely allied to the Subanos of the Moro Province. Visayans and Chinese traders are also found in all large towns along the main river and its numerous tributaries. In the vicinity of Butuan the population is largely Visayan.

The Manobos are farmers, but do not remain in a given locality for any length of time, preferring to move from place to place, and practice a roving form of agriculture.

Hemp is, and has been for many years, the great commercial product of the valley. Rice, corn, coffee, cocoa, tobacco, and vegetables also flourish. Rubber does not seem to do well; probably on account of the stiff soil and cool climate.

Practically the entire valley is forest covered; cultivated land being limited in area, and confined to the immediate vicinity of the large streams. During the last thirty years large areas have been cleared, cultivated, and then deserted by the natives. Such land, if uninjured by fire, rapidly returns to a forest condition.

In general the forests of the valley may be roughly classified into two types: "buquid" or hill type, and lowland type. The buquid type contains a much heavier stand of commercial timber species than the lowland. Lumbering these hills would in many cases be difficult, on account of the steep slopes. The hill forest usually consists of a rather open stand, with the important commercial species occurring in small groups.

The forests of the lowland are composed almost entirely of softwood species, with scattered trees of such hardwoods as camagon, narra, and tindalo. The undergrowth, consisting of bejuco (rattan), vines, herbs, and small seedling trees, is dense, especially in low, damp situations. The merchantable trees of this type are of larger diameter than those found in the hills, but usually have a shorter clear length.

Lumbering in this region would be rather more difficult than in other parts of the Philippines on account of the scarcity of labor, and the lack of transportation facilities. Trails are almost unknown in the valley, and the few which do exist are passable only on foot, even during the dry season. Water transportation is available during the entire year, except for the months of November, December, and January (the rainy season) when the river is very high, and filled with floating logs.

The labor problem can undoubtedly be solved by the importation of men from other parts of the Islands. A number of the large hemp companies of the Agusan Province have imported Visayan workmen, who have proved very satisfactory when accompanied by their families. The wages paid to the Manobos of the valley vary from $4 to $5 United States currency per month, with food. Probably $7.50 per month, with food, would be about the minimum for imported laborers.

A company contemplating logging on this tract should be prepared to set up a saw mill, and to own or hire steamers or lighters for the transportation of the sawn lumber to the various markets of the Islands—Cebu, Iloilo, Manila, etc. It would also be necessary to figure on 80 per cent or 90 per cent of the total cut being softwood. With a ready market for such lumber, and a good logging manager, lumbering in the Agusan Valley should be a profitable enterprise.

MANUFACTURE OF MATCHES TAKES MUCH FINE TIMBER

THE civilized nations of the world strike three million matches every minute of the twenty-four hours. Nearly one-half of these are ignited in this country. Americans use up the enormous total of seven hundred billion a year, and have a larger match bill than any other nation in the world.

Hundreds of factories over the country are engaged in this industry, about which the general public knows but little. Some of the plants are very large; one on the Pacific Coast covers 240 acres, and has thirty-two miles of railroad to supply the match machines with 200,000 feet of sugar pine and yellow pine logs a day.

A statement of the number of cubic feet of wood which actually is converted into matches each year would convey only an inadequate idea of the number of trees required for the industry. For the manufacture of the match, the best grade of wood is necessary. Sapwood, knotty, or cross-grained timber will not do. This makes it necessary to search the best forests and pick out the choice trees only, and nothing but the choice portions of the choice trees go to the match machines. It may be seen that the lumberman sweeps over a wide area in search of suitable timber to feed into the match machines.

Seldom is the little splinter tipped with sulphur given even a scanty mention in the considering the depletion of the world's finest forests; yet the manufacturers of these little fire sticks are as much concerned over the timber supply question as any other class of woodworkers. No scraps or left-over material can be put into matches. This is because the wood has to be cut into such extremely small portions, each of which must be strong enough to avoid breaking when the match is scratched. Therefore the rejected timber from the match factories is good enough to be made into many articles of a larger size; and the by-product end of the match business becomes the largest end, so far as bulk is concerned. Among the by-products turned by the large Pacific Coast factory just mentioned are 1,000 doors and 800 sashes daily.

As a matter of fact, it would be impossible to carry on the match business at all, at present prices, if the rejected lumber were not worked into something else. The room where matches are made is frequently the smallest department of a match factory. The larger portions contain the sawmills and planing mills where doors, sash, shingles, lath, siding, posts, cordwood, and many other salable commodities are made ready for market.

This country, although it has the most abundant material and the finest machinery in the world for the purpose, does not manufacture enough matches to supply the home market. Thousands of dollars' worth are annually imported from Germany, Austria, France, Sweden, and other countries where they are made by cheaper labor and poorer machinery, and usually from higher-priced wood, though it is not better than what is grown in the American forests. The imports are largely safety matches, which can be struck only on the box or other specially prepared surface.

Wood for matches is a much more serious problem in some of the European countries than it is as yet in the United States. The most suitable match timbers are pine, linden, aspen, white cedar, poplar, birch, and willow. Others, however, are occasionally used. Germany imports willow and aspen from Russia. Some time ago the German match manufacturers petitioned the minister of agriculture

to cause the foresters to plant aspen in the state forests to supply wood for matches without importing it. A similar petition to their government was presented by the French manufacturers of matches, who wanted a home supply. At the same time the Russian manufacturers of matches asked their government to take measures to check the export of match wood to foreign countries, because the material was needed at home.

In the United States, as well as in Canada, a diligent search for choice forests is maintained, and very large tracts have been bought by companies in the match business, not only to meet present demands, but to provide for years to come. In a single year one match company cut 225 million board feet of pine in the Lake region. The cut in that instance was exceptionally large, however, in order to save timber which was threatened by the ravages of a bark beetle. There are more than 150 match manufacturers in the United States, and about half that number in Canada.

Matches are manufactured in many ways and with numerous kinds of machines, and for that reason a description of an operation in one factory would not apply to another. Nearly every manufacturing company has machinery made specially for its use, and covered by patents, and it also employs processes discovered or devised by its own chemists and mechanics, and kept secret to prevent rivals from obtaining and profiting by them. Some time ago an American company sold the right to use its special machines in France, obtaining $100,000 in cash and an equal sum yearly as royalty. This shows how much depends on the machines, and how much a match manufacturer will pay to get the best. Only by using the best that is obtainable is competition possible. A single machine has been known to turn out 177,926,400 matches in one day, boxed and labeled ready for shipment.

Some matches are shaved with the grain from sawed blocks, some are cut both ways by saws. In some factories the blocks are boiled to make them cut easily. By some machines a boiled or steamed log is revolved on its own axis and a shaving—the thickness of a match—is cut round and round. This shaving is at the same time cut into lengths and split into match sticks. There is hardly a limit to the varieties of methods employed. Round matches are made by forcing them through dies. The Japanese make paper matches, which are wood after all.

In common with other industries of the United States which depend upon existing forests, the match-makers are within sight of a shortage in the wood supply. When present timber holdings have been depleted, they can not be duplicated. If forced to economize, the people of this country might get along with fewer than twenty-five or thirty matches a day per capita as at present; but they will probably insist on having them, and will demand, as in Germany and France, that foresters plant and grow timber especially for matches. This could readily be done if forests were placed under competent management and not left to run wild, producing cordwood and brush when they ought to grow merchantable timber.

PRIVATE FORESTRY AS AN INVESTMENT IN THE UNITED STATES

BY

ERNEST BRUNCKEN,

Chief of Sociological Department, California State Library

ALTHOUGH the owners of the timberland in the United States now seem to be coming very rapidly into that state of mind where they consider a technical forester as necessary for the conduct of their business, it is clear that most of the "forestry methods" now being introduced amount to no more than conservative lumbering. It is still principally what one might call "extractive" forestry, the harvesting of the supply furnished by unaided nature, only some care is taken to avoid unnecessary waste. One might distinguish between the "extractive" stage and "productive for-" estry," which produces forest supplies by the application of capital and labor to the land. The latter method is still a rare exception in this country. It may be worth while to analyze the conditions under which the transitional stage of conservative lumbering may be expected to give place to true productive forestry by private enterprise.

This method of timber production involves the investment of capital for long periods, with the probability of but small returns. These returns are entirely dependent on the annual wood increase of the growing timber. With all the species now ordinarily coming into market this increase is very moderate even under the best of conditions, and even more so on the inferior lands that are most to be devoted to such purposes. It is true that some special kinds of tree, such as several varities of eucalyptus, have a much higher percentage of increase. But these are adapted to a few districts only, and no matter how excellent they may prove to be, will not for a long time be of much importance to the market.

Under these circumstances an investment in productive forestry cannot be expected to bear a rate of interest much above that yielded by other long investments. Probably from two to three and one-half percent is all that one dare assume. The question then is: What class of investors are likely to be attracted by such low rates of interest?

As is well understood, other low-rate investments, as for instance Government bonds, are in this country made almost exclusively by banks and other financial institutions which use them as pledges to secure note issues, deposits of public funds and the like. The rest goes to the trustees who look to the greatest safety rather than to profitable returns in the management of their funds. The private investor in the United States very rarely cares for investments of this kind. He is quite willing to accept a risk materially greater than that represented by Government bonds, provided that the rate of interest is higher. The lowest interest rate acceptable by private investors in this country may be said to be that paid by the savings banks. But in all probability the majority of investors in savings banks consider their deposits therein more or less temporary. Just as soon as they have accumulated enough, they will draw it out and invest their money either in a home or in some business enterprise.

Up to this time practically every American who has had money at his command over and above a little provision for a rainy day has had the desire to speculate with it. He has not

looked for long and safe investments at low interests, but for opportunities to double or triple his capital within a short time. The man with a small capital hopes to make it a fortune, the moderately wealthy man tries to become rich, the rich man a multi-millionaire. As long as this state of mind exists, private productive forestry is not to be thought of in this country.

In Europe there are multitudes of people with more or less money to invest who never think of risking it in an enterprise that may promise great gain but may also result in loss. They are looking for safe investments, even if the rate of interest is small. Moreover, they wish to be spared as much as possible of the trouble connected with the management of the enterprise and with frequent re-investments. Therefore they are looking for long investments, and for those in which they need not employ their labor as well as their capital. Not until there is a large number of people in this frame of mind, is there any probability of private productive forestry becoming attractive.

There are, however, still other conditions that must be fulfilled. The holding of forestry lands in this country is not yet a safe investment in the sense in which it is so in Germany. The fire danger must be considered, although, on the large tracts which would of necessity be involved, that could be kept under control. It is greatest where the land is subdivided. But more to be dreaded is the question of taxes. How seriously our barbarous tax system affects such investments is probably familiar to all readers of this paper.

Assuming that the fire and tax problems can be solved, the question arises: What probability is there of a number of such investors as described above arising in this country in the near future?

Fifty years ago, there were comparatively few large fortunes in the country, while the probability of small investments combined with the personal efforts of the owner leading to wealth was very considerable. It might be said that at that time almost everybody was trying to build up a fortune. Gradually the situation has been reversed; there are now many established great fortunes, but the probability of new ones being built up has become comparatively small. Productive forestry cannot build a fortune, but it may be an excellent conserver of fortunes already existing. It may be reasonably expected that an increasing number of our wealthy men will see this, and turn to investments of this kind. Very likely, many of the timber tracts that now begin to be conservatively lumbered, will gradually be brought under truly productive forestry. To what extent the fact of corporate ownership of most of these tracts will affect the question, may well be discussed at another time.

Too much need not, however, be expected in this direction. Even in Germany or France, it is not at all probable that many large fortunes would to-day be invested in large forest enterprises. Those now existing have almost existed for generations. Even to a rich man, the profits of forestry look rather small, while the difficulty of changing the investment is a great draw-back. For large forests are hard to sell, except to lumbermen who will destroy them, and almost impossible to mortgage.

So far productive forestry has been considered exclusively as a business for itself, devoted to producing for the market. It must be confessed that the outlook for this sort of investment in the United States, although not hopeless, is not very promising. However, there is another form of private forestry which seems to be much more adapted to American conditions, and, consequently, now making fairly rapid progress. This is the management of forests, not to produce for the open market, but to raise raw materials needed in a particular enterprise under the same ownership. A very large part of American timber

lands is now in the hands of manufacturing concerns holding them for this very purpose. As the owners hope to stand in need of raw material for an indefinite time, they are very rapidly adopting conservative lumbering, and will in all probability arrive at the productive forestry stage in due time. Analogous are the forestry undertakings of railway corporations, such as plantations for growing ties. Forests devoted to such purposes might be called "auxiliary forests," distinguishing them from those managed as separate enterprises, for which one might coin the technical term "autonomous forests." With the auxiliary forests should be classed also the great number of farm timber lots. This system of forestry is at the present time little known in Europe, and in the treatises of European writers is often treated as an undeveloped stage. However that may be, it seems to hold out the only promise of vigorous development of private forestry in the United States. It seems to me highly probable that the general public will in the future, after the exhaustion of the natural supply, have to rely principally on timber grown in public forests. This opens up the question of a very considerable extension of the reserve policy, especially in the hardwood regions. But that need not be discussed in this article.

THE WRONGS OF MOTHER EARTH

BY

Robert Stephenson, Mount Tabor, New Jersey

O Mother Earth, thy lot hath been full sad,
And greed for wealth hath surely made men mad,
That they should rob thee of thy wondrous garb,
In which thou w'rt clothed by Almighty God.

Thy mountains have been stripped of forests green
Until we weep, such horrid sights are seen.
Thy valleys rent and scarred with ghastly seams,
Thy lordly rivers turned to turbid streams.

And all for what? For greed of tawdry gold!
Because men worship still that god of old
Before which Abram's children danced and sang
Til all the desert with their praises rang.

But as of old that golden calf was broke
Thou too shalt rise and with a mighty stroke
Strike, not the calf but them that worship it.
Nor may they 'scape, nor lessen it a whit.

By night the skies shall answer to the glow
Of raging fires on the earth below.
By day the sun be never seen to shine,
And vengeance for thy wrongs shall then be thine.

The floods, that in thy kindness Thou hast kept
Beneath thy forest shade and ocean depth,
Shall burst their bonds and rage through all the land,
No more shalt thou put forth thy staying hand.

And when the fire and flood have spent their force,
Then men shall see the error of their course,
Shall know the fatal ruin they have wrought
Would not have been had they but taken thought.

WORK IN A NATIONAL FOREST

BY

Charles Howard Shinn, Forest Supervisor, Sierra National Forest

No. 5—Holding Down a Mountain Fire

THE pretty girl next to whom I was placed at the dinner party had heard about forestry.

"You keep people from cutting down trees," she confided, "and you put out fires. I have a brother who would like that. He loves to run with the engine."

I wondered how I should break it to her that my wicked rangers had lately come in from marking for slaughter (and sale) several thousands of fine old trees. Also, a picture rose in my mind of a lovely new red fire-engine, straight from Metropolisville, manned by a brilliantly uniformed crew, dashing in magnificent defiance up the rocks of Goat Mountain, through chapparal and over five-foot fallen logs, leaping hundred-foot chasms, while the pretty girl's ambitious brother chased it for fifteen lively miles.

As in a dream I saw a group of helmeted firemen surrounding with their waterless hose a burning pine, or wallowing through stubborn manzanita, scrub-oak, and mountain mahogany, a little later, in a desperate effort to save their new red engine from total destruction—and incidentally to find a drink of water!

The contrast between these pictures, and those grim, hungry realities of the strong-hearted wilderness when it goes on what one of my rangers calls, "a regular howling drunk of a fire," held me speechless on the verge of boisterous laughter. Then I struggled, quite in vain, to tell her about a real mountain conflagration, and how our untaught, unconscious heroes meet it when it comes, seize it, shake it, choke it into silence and oblivion; then stagger into camp, or drop exhausted on the burnt edges of their fire-lines.

"We put out fires with hoes, rakes, shovels, matches, bits of sticks, or our naked hands; we burn our clothes, singe our beards, blister our faces, ruin a seven dollar pair of boots, lose our voices in the hot smoke, go short on grub, discover a Garantuan thirst. We have all manner of laughable experiences."

One of my rangers came in on the stage, saw that there was a fire up in the woods, dropped his grip-sack, and borrowed a hoe from the genial storekeeper (we call him the Mayor of Northfork—there are two stores and about eight houses in the place.) So this ranger turned up about midnight on the fireline, and just where we needed him most. But he had on a new suit of store clothes which had cost him one-third of his month's salary of $60.00.

So we shouted at him: "Pull off those duds; get into some overalls. No dudes wanted up here!" He hung coat and vest on a bush—they were burned up an hour later; he came into camp, when the fire was conquered, with very nearly half of his pantaloons left, and something more than one shoe. Then we told him that we hoped it would be a lesson to him the rest of his life to avoid ostentation, and he said it sure would.

I knew one ranger who headed off a small fire before it jumped into a big one by the simple process of scraping pine needles and pulling brush with his naked hands, which pretty soon were torn and bleeding. But he continued to crawl along the line, and widen it out till the work was done.

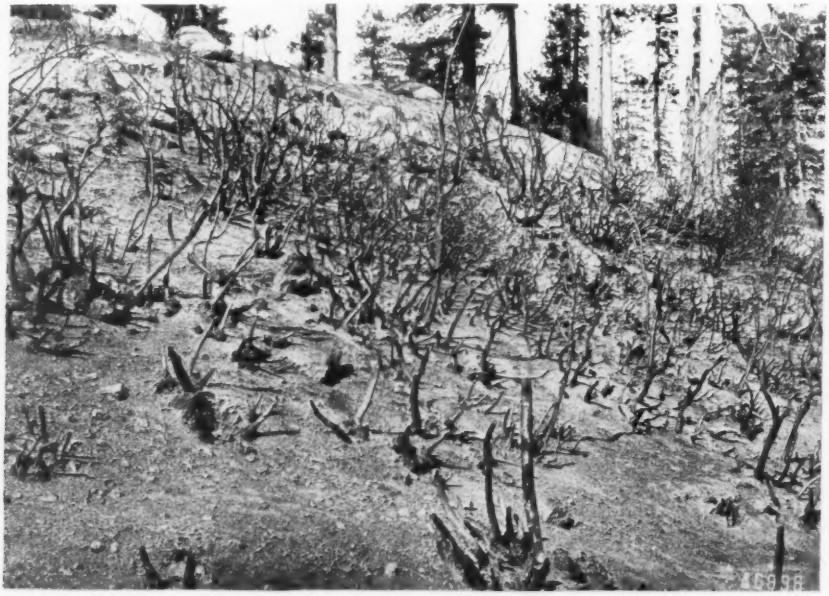
Do you suppose that any of this

went into his report? Of course not. He simply said: "Put out one small fire; about six acres burned; no damage to timber." He was exceedingly angry at himself, however, because he had been caught without matches or fire-tools. Such details as those mentioned above seemed to him wholly irrelevant. The only item in his view that anybody cared for was that the fire was good and out; he added the remark about timber mainly for his own satisfaction. In the face of the main fact, who on earth cared one continental whether the ranger had any finger nails or cuticle left? Certainly not the ranger himself. And why in conscience should he care as long as he had grass for his horse?

"What kind of a man was that ranger?" the girl in the story asked me.

"A homely, flea-bitten, pock-marked, stubborn, grizzled man, who had seasoned up in all sorts of weather, and was like a piece of English oak. He looked and acted as if he would never wear out; and if you were in a tight place, and saw him coming, your heart would laugh within you. Lastly, he swore beautifully—on the slightest provocation."

The girl in the tale considered this horrid, but she wanted to hear more about it all. Of course, one could not tell her much—the thing doesn't fit in very well with an orderly dress-suit banquet where only the First Fiddle speaker of the evening dares to display enthusiasm on a liberal scale. (And the First Fiddle was discoursing just then with admirably simulated despair upon the "Dangerous Tendencies of the Modern Drama.") I listened to him awhile, sorry from my soul that I had taken my two weeks "leave with pay." As I remember it, I went home to my forest in just three days.



Forest land which has reverted to chaparral, and the chaparral in turn has been burnt to an extent which destroys its value as watershed cover

But now that there is a stillness un-

Fire running from open chaparral field into green timber

der the giant sugar pines of Ellis Meadow, I can write down some of these as yet unsaid matters about our mountain fires. And, first of all, let me emphasize the importance of saving every tree, large and small, that

Chaparral conquered by yellow pine—Fire danger here slight

we can save from fire, at any cost of time and money.

Would it surprise you, my reader, to be told that any one of a dozen of these sugar pines contains something like ten thousand feet of salable lumber? One was cut up here last August that contained 35,000 feet! Some of these pines began to grow before Spenser wrote his Faery Queen, or Raleigh cast his embroidered cloak at the feet of stately Elizabeth, or the baby Shakespeare opened his eyes on English daisies. For trees such as learning how to take hold of their work.

Out here with the steady trade winds, the rainless summers, the immense accumulation of dry and resinous materials, the constant travel all through the Forest—Indians, lumbermen, miners, cattlemen, tourists—one certainly lives on the wavering edge of trouble between June and December. The whole country fills with smoke from stubble fires in the San Joaquin Valley, and from brush fires in the foothills outside of the Forest.

Surface fire in open pine stand, consuming grass cover

these, and for their children's children, clear down to the last year's seedlings, plain mountain men are more than content to crawl on hands and knees under spurts of flame in red-hot gulches, in some life and death struggles toiling all night long, like Titans lent to us from some greater planet. To spoil such work with praise were a shabby use of words; let us take the results, rejoicing that such things are; and let us confidently lean upon this primal fact, that the field men of the Forest Service are

Suddenly this dull haze thickens, blurs, and threatens, or it begins to glow with dark and troublous red.

Somewhere, in some canyon, there is fire, which must be found by sight or smell, or by news from some traveler. If you can discover and reach it in an hour two men can handle the fire at a cost of less than fifty dollars; one man even may hold it in check till help comes. But if three hours are lost before the place is spotted by the rangers, "we the people of America" may lose fifty thousand dollars in tim-

ber alone—or may even witness in helpless regret one of those never-to-be-described over-head fires which have sometimes wiped out the timber resources of whole counties.

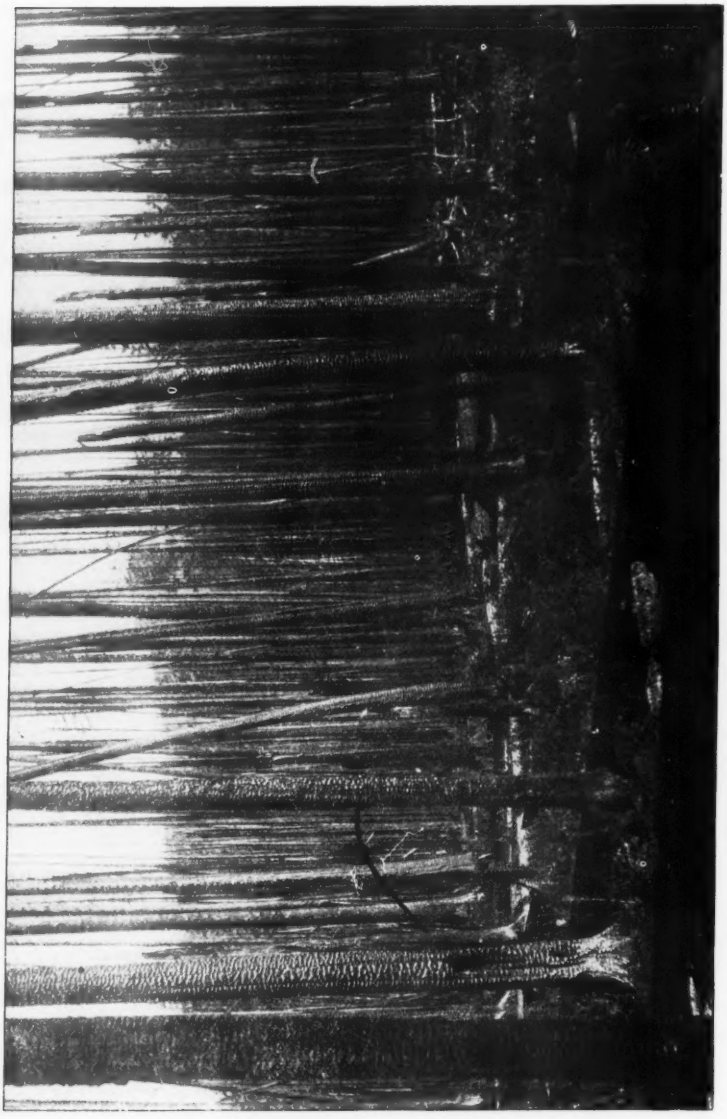
Beyond question the greatest enemy of the forest is—fire. Where a great fire has run, the soil itself may be ruined beyond restoration for many decades, the "old burns" remain most ghastly places. Where even a little fire has passed, the reproduction is checked, the brush creeps in, the insect enemies flourish and multiply. And it is the little neglected fires which in the aggregate do the largest amount of harm to the forest. Stubborn, ignorant, or careless people who leave camp fires burning, or set brush fires in their own fields, or toss cigar butts and cigarette ends in the brush as they ride along the trail—these are the real enemies of our work. Out of a hundred fires, I think that ninety-nine are simply due to stupid ignorance and foolish carelessness of men whose interests are really bound up in the welfare of the forests. Habits are hard to change, as we all know, and this fire-scattering habit of Americans is hard to remedy.

I have known respectable people in San Francisco, whose money was invested in mountain communities, wholly dependent on the lumber industry, to go far up in the Sierras for a Fourth of July, and shoot off no end of rockets from their camp in the tall timber. The poor Indian squaws who start a fire to smoke out wild bees and wasps, the mountaineer who burns a troublesome log that lies across the trail, have some excuse for what they do, but the man who carries a hundred dollars worth of fireworks to his Sierra camp (as I once knew of) is something very near to a criminal.

Cleared fire line, 200 feet wide, in pine forest—Tall dry grass and young pines in foreground

I have always felt an interest in

what may be termed the Piute system of forestry. It has often reached the dignity of print; it has even found distinguished (and vituperative) advocates. When I came here to the Sierra Reserve, every one, without exception worth noting, argued openly that fires did no harm at all; but rather did good by opening up the brush thickets, by increasing the feed for livestock, and by destroying dead and fallen timber, pine needles and the



Burnt white pine in Priest River National Forest—Total loss

worthless "bear brush" *(Chamaebatia foliosa.)* Rising to the main point, this theory further holds that fire in all the forest each year is wholly beneficent; in brief, that Piute forestry is the only scientific method. Stripped of the non-essentials, it is thus held that because the Indians used to burn the whole country every summer this was mighty good practice for white men to adopt.

Those short-sighted neighbors of mine who believe this forget, or do not know, that the Indians who first set fires in our Sierras were broken Piutes of whom tradition relates that they were cast forth and driven helter-skelter out of Nevada into the mountain fastnesses some hundreds of years ago, becoming the Monos of today. It grieves me to say it, but we have no evidence that these Indians were really trained foresters or even practical lumbermen. I hate to mention it here—but they were not American home-builders, the planters of gardens, the fencers of fields, the users of wood lots. They were children of Nimrod; they desired clear spaces under the great pines in order to aim their obsidian-tipped arrows. For that, and that only, they flung wide their fires in the forests of the Sierras.

The mountaineers in this region have almost wholly ceased to swear by Piute forestry methods. They prefer to have timber, mills, towns, prospective railroads, and all that. I know one lordly pioneer who long declared, sitting like a white-haired god on his front fence, that "the Indians knew more than all you forest people, and if there was any nerve left the whole Sierra would be burned over from end to end." There came a fire one summer on adjacent private lands that

Over mature chir pine forest, with advance reprcduction due to protectiсn frcm fire—This scene is in a government forest in India

caused him a loss of several thousand dollars before the rangers could handle it. Everyone noted that the old lion ceased growling and fought fire desperately. It only half converted him, but it took most of the snap out of his tirades.

I cannot possibly write down all the stories of great fires that are already traditions of this Forest. But when I stop, just here, and ask the one whom I always do ask when help of any sort is required, "Which is our best fire story?" that personage replies, "The fire that had the most mishaps."

View in San Gabriel region of southern California, where only small brush is left on several important watersheds—Forests swept away by reckless cutting and fire

It was in the winter of 1905. A severe autumn had extended into a dry, cold December. There came a wild wind-storm, and whoever was out in it all night wanted a fire no matter what happened. Drunken Indians were plenty in the villages and along toward morning some "struck out" for their "wickiups."

It was so dry, cold and windy that rangers were on patrol half the night. I had gone to bed when a man galloped up the ridge shouting "Fire!" and I "piled out," with a young ranger. We saddled as quickly as we knew how, seized heavy hoes and axes, and galloped down the canyon towards the nearest angle of the fire, which was on both sides of the creek and on two ridges, and was rapidly spreading in every direction, north, south, east and west, under the gusty, changeable wind, which seemed to blow from every quarter at once. We picked up a few Indians who were sober and set them to work; we kicked and hammered three drunken Indians up from the trail, where they were in the immediate fire-track. Then we took hold, backfiring, cutting paths through dry grass and all sorts of inflammable under growth, in order to control the situation, rolling logs, dragging away brush piles, cutting dead trees.

At other places on the fire circle,

which was four miles around, people were taking hold, but we could not leave our particular fight long enough to connect with anybody. If we could not hold that gulch somewhere, the Forest office, some rangers' cabins, and all we had to show for several years work, would be wiped out. So, of course, we held it.

Everywhere else, too, the rangers and the neighbors, and men from Power House No. 3, were fighting fire like Turks. About the circle of the hills five or six brave and kindly women were making coffee and furnishing "grub," all night long. It tasted mighty good, when you got within reach, and could leave the work ten minutes.

Came a ranger's wife on horseback about two o'clock in the morning, and went on the fire line with her husband till seven. When we praised her for it she only said, "You needn't suppose I did it for your old forest; I only wanted to get Jeremiah home, and rest him up."

When the fire threatened a village near it, a bunch of volunteers started out from a saloon, armed with several

Slopes on northern side of Grayback Range, San Bernardino National Forest, California, bearing lodgepole pine and limber pine—Altitude, 11,000 feet

(*See page 659*)

bottles. They got as far as the bridge over the creek. They went underneath, finished the whiskey, and went to sleep there. But it afterwards appeared that they had done nearly all of the hard work on the fire line!

Three Indians were set at work back-firing. The next day six Indians appeared, all claiming to have toiled all night on the fire line. They looked so much alike that it was hard to pick out the three deserving ones—but we did.

It seems to me that every great mountain fire emphasizes two things: the need of more trails, bridges, high outlooks, telephone lines, and ranger-camps; and the necessity of solving the "brush problem." There is room for a symposium on this, and I hope that every forest supervisor who reads these lines will contribute his views.

When we have telephone lines we can begin to utilize outlooks at present useless. We can hold a rock-shelter near the very top of a mountain peak; can pack in a ranger with supplies, and let him hold such a lonely fort from July to October. Perhaps we can give him a heliograph, and let him flash the story to headquarters. He can have maps and instruments, so as to locate each fire certainly to the township, and often to the section.

It will be a lonely and a wonderful life away up above the clouds, and near to the stars. Twice a month, let us say, a ranger will bring in mail and supplies, and tell the news. Once or twice a summer the exile will be able to shake the whole country with his call, will focus rangers from all points of the compass on the field of action, and will read the story of their success in lessening flames and smoke. For the most part he will watch and think all day on that granite eyrie; and at night, by his camp fire, will twang his fiddle for companionship, or pour out the finer essence of his nature in letters to some far-off, lovely human help-mate, or dream, or inspiration. We shall call him an earth-astronomer—and the crest of Signal

Road and path (on left side) serving as fire lines—Surface fire checked—Limit of fire shown by unburned grass

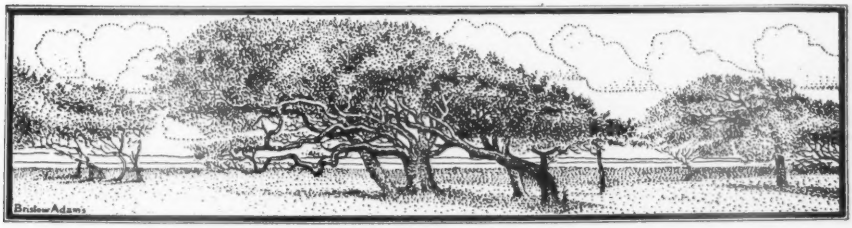
Peak, or Shut Eye, will be his Lick Observatory. Let no one pity such a ranger, for his loneliness will make him master of himself, and thence of fate and circumstance.

As for the Brush Problem—which the ignorant Piute foresters bequeathed us by their system of destroying the young timber, it seems to me that we have to consider a number of items such as these: soil, exposure, elevation, rainfall, natural growth, possibilities of slowly changing brush-land into woodland, and woodland into real forest. I am absolutely sure that the yellow pine is extending westward towards the foothills, in many places on this Forest. I think that this is primarily due to the "care and protection" afforded by the methods of the Forest Service, especiallly in regard to grazing and fires.

But there are large areas of dense "chapparal" where this peaceful extension of the forest ceases. Less "brush," more rainfall, some seed-trees—and the scale would slowly turn. It is far too expensive to cut or pull the chapparal and then seed the ground. Can the scattered oaks and pines be protected from destruction, while the chapparal is burned in strips, taking perhaps three years to clear the whole surface? How many men and what kind of organization will make such work safe and effective? Is it not possible that experiments on a large scale may show that the remedy for the evil done by Piute forestry is simply the intelligent use of a match box in the foothills, below the line of "tall timber?"

It is easy to object that when you burn you destroy the soil-cover and the humus. You certainly lose a lot. But if the oaks increase and the pines come in you more than get it back. The humus-producing value of the annual crops of grasses and "weeds" which take the place of the chapparal in this climate can hardly be over-estimated. Oak leaves make a better seed-bed than chapparal leaves do. The leaves of our ceanothuses, manzanitas, etc., are very coriaceous, lasting many years; oak leaves decay the first season. If one can get the brush out of the way, the trees move down, especially when the two or three "wet seasons" of a California climate happen to come together.

Really, I do not know of any greater forest problem than this one—thus briefly stated: Can we make fire our servant and helper in changing chapparal to woodland and in changing that woodland into timber region? It is a problem of the semi-arid West; it is the largest and the most fascinating of all our field problems. Sometimes when I talk it over with a little man, fresh from the lecture room, he says, "utterly impossible." The large man, who loves nothing half so well as to see impossible things done, says, "It is worth study and experimentation." Let us leave it there—the fundamental problem of foothill forestry in many places in California.



RUSSIAN MULBERRY IN A GOOD SITUATION

IN THE spring of 1884, Thomas Holliday planted Russian mulberry seedlings on the north and east sides of his orchard, spacing the trees ten feet apart—480 linear feet. The site is four miles north of Downs, Kansas, in a bend of Elm Creek, close to an underflow, and subject to frequent overflow. Downs is three miles west of the 98th meridian, midway of the State longitudinally, and thirty miles from the Nebraska line. The trees received cultivation the same as the orchard for a few years; then the farm was sold, and later all buildings were removed. It is now rented, and with the exception of protection from stock, the trees themselves forming posts for the wire fence of the pasture, no care or cultivation is given.

At twenty-four years from seed the tallest tree now measures forty feet in height, and the average is not less than thirty-two feet. The protection to the orchard from wind is ideal. Nearly all of the trees fork at about two or two and a half feet from the ground, into three prongs as a rule, which are usually sufficiently straight to produce good posts. The average basal measurement is 15.8 inches. The heartwood follows the sapwood

Branching habit of Russian mulberry—Trees 23 years old, 18 inches in diameter at ground, with branches 8 inches in diameter breast high

closely. In a diameter of eight inches, some six and a half inches, all but the last four annual rings, is heartwood.

The first cut of the prongs will split into four posts per section, the second cut will furnish an excellent corner post or two large half-round posts. From eight to twenty-two additional round posts can be secured of size approximately two and one-half inches in diameter at the top end and four to four and one-half inches at the bottom. Mr. John Tetlow, a farmer of excellent judgment, estimates that the trees will yield from twenty to thirty-five posts per tree. This cruise closely tallies with the estimate of Mr. George H. Montague, the present owner, based on measurements taken in August. There will be, besides, the usual amount of fence stays and fuel wood.

Last spring Mr. Montague cut 120 posts from the row on the east, 240 feet long, an average of one post for each alternate foot. In fact, he secured the posts by cutting the smaller prongs of a few trees. If all the trees were similarly thinned the trees would still form an adequate windbreak. From one tree, similar to the one shown in the accompanying illustration, twenty-two posts were secured, leaving the main stem to grow into larger timber.

Cross section from branch of Russian mulberry 23 years old, showing how closely heartwood follows new growth, accounting for the durability of mulberry, properly seasoned, in contact with the soil

Second growth is good. From the root collar of each of the trees trimmed, sprouts soon appeared, and some by August had reached a height of nine feet. Birds carry the seeds to a belt of boxelder trees adjoining, where forest conditions of litter and humus have formed. It is interesting to note that in the reproduction, mulberry out-

numbers boxelder ten to one. From these seedlings Mr. Montague is starting another plantation.

As the price of Russian mulberry nursery stock is two or three dollars a thousand, this natural reproduction effects a considerable saving in money; and what is still more important, renders it possible to do the transplanting at convenient times, when all the conditions of weather and season are right. Where trees are already bearing fruit, it will pay to establish suitable conditions about the trees, in order that seedlings may start.

Abundant reproduction of Russian mulberry where forest conditions have been established

This example of growthy mulberry demonstrates the peculiar adaptation of the tree to rich loam where the water table is from ten to fifteen feet below the surface. Situations nearly or quite as good can be found on many farms throughout a belt running through central Kansas, Oklahoma, and Texas. These sites, if occupied by Osage orange or mulberry trees, would supply the entire demand of the region for fence posts. Most of the posts now used in this region are sawed half-round and quartered white cedar from Wisconsin, Michigan and Minnesota. To-day is an opportune time to select the site and next spring is the time to plant, for there is barely time enough to grow a crop of posts before the white cedar supply will be practically exhausted.

THE STERILIZATION AND PRESERVATION OF ELECTRIC LINE POLES*

BY

H. P. Folsom, Circleville, Ohio

IN MAINTAINING telephones, telegraphs, electric lights, and interurban railways, one of the greatest problems that confronts the management is the inevitable depreciation of the outside construction work of their plants. One of the largest items of this depreciation account is that caused by the rotting of their poles.

The importance of this subject will be appreciated when we say that there are 250,000 miles of telegraph lines and about 500,000 miles of telephone lines in the United States, making a total of 750,000 miles. It is safe to say that these lines average thirty-seven poles per mile, making 27,750,000. The poles used for electric railroads and electric light plants will make an addition of 5,000,000, or a grand total of 32,750,000 poles. This is in accordance with the Government report of 1902. It is estimated that there are over 40,000,000 poles in use by the above companies in the United States at this time. The value of these poles placed in the ground ready for use, will average from five to seven dollars each, or about $200,000,000. This vast amount of property is exposed to the weather, and is constantly decaying; this decay goes on day and night, and is as certain to cut the pole down, as death is certain to overtake man and cut him down.

It seems strange with all the boasted scientific knowledge and great inventive genius of the American people, they allow over $200,000,000 worth of property to remain exposed to the ravages of wood-destroying bacteria and fungi with scarcely an effort to find a remedy. It is evident that if some means can be found to destroy these germs at the soil line, and at the same time protect the pole from the attack of those which remain in the surrounding soil, at a reasonable cost, the great problem of the depreciation of telegraph and telephone poles will be solved. If the life of a pole from the surface of the ground up and down a few inches can be prolonged ten or twelve years, it will add millions of dollars to the values of our telephone plants, and the stocks and bonds of all companies that use poles will be vastly increased in value.

The average life of a white cedar pole is said to be from twelve to fif-

*A paper read before the Independent Telephone Association of Ohio, at Columbus.

The writer of this article states in a private letter that the experiments are still progressing and giving results equal to expectations. For instance:

"We are removing some jackets upon poles that were treated with antiseptics six years ago. The poles treated were decayed to a depth of about one inch and a half at the ground line, and would not have stood under the most favorable circumstances more than two or three years, and of course would have been very weak. We found that they were in the same condition that they were at the time of treatment. The decay had not progressed at the ground line to any perceptible degree; and the jacket or sleeve, although of an inferior quality, was in fair condition and would have lasted many years longer. * * * *

"The expense, upon which the practicability largely depends, is low enough to justify any company in making use of it, even though it purchase the antiseptics at retail prices, as we have done."

teen years; it varies, however, owing to its condition when placed in the ground and the nature of the soil and climate. All poles and posts rot off, at or near the soil line. The decayed portion extends a few inches above, and about three or four inches below the soil line, the depth below being governed largely by the nature of the soil. The portion of the pole from the soil line to the top will last many years. Indeed, there is reason to believe that it will last three times as long as the portion that goes into the ground. Again, millions of poles are being used each year to replace the ones that have rotted off. The Bell Company used over 500,000 poles in one year to replace old ones. Vast areas of forest are being denuded each year, and the poles are constantly growing scarcer as well as more expensive. Where the telephone and telegraph companies are going to procure their poles in the next ten or twenty years, is indeed a problem worthy of the most careful consideration.

CAUSE OF THE DECAY AT THE SOIL LINE

It is a singular fact that it is only of recent years that the true cause of the decay has been discovered, although there have been experiments made for the past forty years to preserve poles.

It would be interesting, if time permitted, to follow the many experiments in Europe and America in this line of investigation. Indeed, our own many failures and successes in the past six or seven years would not be uninteresting. In many ways we have been fortunate. We have had the benefit of the experiments of the most learned scientists that have preceded us in this line of investigation; their mistakes as well as their successes have aided us. There is no lack of literature on the subject of preserving timber, covering the past seventy-five years. Since the germ theory of disease was recognized as true, the subject has engaged the attention of some of the most accomplished bacteriologists and microscopists in this country and in Europe. The United States Forest Service has in the past two years been experimenting, with the co-operation of the Western Union Telegraph Company, in the preservation of telegraph poles. The results of their work have not been made public, on account of the time engaged being so short.

The great trouble with most of the work done is, the experimenters have been endeavoring to sterilize the pole before placing it in the ground. Our endeavor has been to sterilize and protect the poles already in the ground.

It has been proved beyond question that the decay which takes place, at or near the soil line of the post or pole, is caused primarily by living organisms, namely, bacteria or fungi, and in some rare instances by insects. Bacteria and fungi are both low forms of life; they multiply, when once they attack a pole, with great rapidity; and since their action on the fiber of the wood is practically the same, they will be considered in this paper together. They attack either dead or living timber; on dead timber they attack the walls of the cells and the result is the familiar decay or rot under consideration.

CONDITIONS NECESSARY FOR THE GROWTH OF THE FUNGUS AND BACTERIA

There are two conditions necessary for the existence and rapid growth of these living germs of destruction.

First. There must be a certain amount of dampness or water.

Second. There must be a certain amount of heat.

Some scientists assert there must be, third, a certain amount of oxygen. This they claim is shown by the fact that bacteria and fungi do not ordinarily affect the pole more than a few

inches below the soil line, unless the soil surrounding is very loose or porous. It has been observed that a line of poles running through a pasture field where there is grass growing will be more quickly attacked than in any other situation. Again, a line of poles situated on the north side of a hill will be more quickly attacked than on the south side, provided the soil is loose and porous. A pole under water will not be attacked by fungi and bacteria; neither will it when surrounded by soils containing certain chemicals. A few years ago it was thought by telegraph and telephone companies that if the dirt was heaped up around a pole, thus leaving a certain amount of drainage away from it, no decay would take place at the soil line. Experience has shown this was a mistake; the pole was attacked just the same, only a little higher.

It will be observed in passing, that the great enemy of the telephone pole is the same that attacks the millions of railroad ties in use. The conditions surrounding a railroad tie are more favorable for the rapid growth of the bacteria and fungi than those of a pole. Ties lie flat on the ground, constantly absorb moisture, and being exposed to the rays of the sun, have the two necessary conditions for rapid growth. The problem of protecting and sterilizing railroad ties is a much more difficult one than we have to contend with in the case of telephone poles, although it is generally supposed by experimenters that this is not the case.

Realizing the great importance of this subject, we began our experiments in the use of antiseptics six or seven years ago, although some of our experiments in the preservation of posts and poles have extended over a period of nearly twenty years. We directed our attention to poles that were in the ground and that were already infected. We believed, if it were possible to save the life of a pole which had already been attacked and was partially rotted off, it would be a comparatively easy task to sterilize and protect a pole which had lately been placed in the ground.

We believe we have found a means to sterilize poles in the ground that is practicable and certain, and that, too, at a cost which is reasonable, and much less than the natural depreciation will amount to.

PROCESS

We cannot better explain our process, at the same time giving you the results of our experience, than by relating some particular instances of our experiments. We were very desirous of making a thorough test; one that would conclusively demonstrate the efficiency of the process. It having been demonstrated by a long line of experiments that the cause of decay at the ground line was a bacteria or fungus growth, induced by a certain amount of moisture and heat from the sun, it was obvious that in order to sterilize and save the line of the pole, we must use an antiseptic that would penetrate the pores of the wood. We selected a class of poles which had been in the ground for about eight years, and which were thoroughly infected with germs; indeed, some of the poles upon which we experimented were over half rotted through, and would not have lasted two years under the most favorable conditions; they were so weak that they would not have survived a severe storm at all.

We dug down around the pole about eighteen inches, and with a pointed instrument scraped out and away all the rotted wood; we then applied our antiseptic chemicals in a plastic form with a trowel, filling all the holes and depressions even with the surface of the pole. We next placed around the pole an especially constructed asbestos jacket that would resist the action of the elements, such as rain, snow, freezing, and thawing. We filled in between the jacket and the pole the

antiseptic material in a powdered form, to the top of the jacket. We allowed the top of the jacket in some instances to remain open, so that it could receive all the rain and snow that might fall, or that might run down the pole. In others, we placed a cap over the top of the jacket. We were careful in mixing our antiseptics to use none that would cause the pole to become brittle and thus weaken it.

We found in all instances, after a period of over six years, that our antiseptics had completely sterilized the poles where applied, and the decay was entirely arrested. In fact, the poles were in as good condition as when the treatment was first applied. We carried our experiments further, and treated a class of poles that had not been in the ground more than two or three years; where the surface indications showed only slight infection, but the sappy portion had begun to scale, and the cracks exhibited unmistakable signs of decay. We did not attempt to clean off the decayed portion of this class of poles, but treated them by placing the jacket around the pole, and depositing between the pole and the jacket our antiseptics, and then sealing and fastening the collar above referred to. The jacket on these poles was about eighteen inches wide, extending below the ground about fourteen inches, and above the ground about four inches. Upon examination of this class of poles six years after treatment, they were found completely sterilized, and free from the effects of the bacteria and fungi. No signs of living fungi could be discovered under a powerful microscope.

COST OF STERILIZING POLES AND THE PROFITS THEREOF

We are fully aware that the success of this process depends very largely upon the question of expense.

We have made some figures based upon our experiments, which show that the cost is within the reach of all companies, and can easily be paid out of the depreciation account and still leave a handsome surplus.

Suppose we take a plant of 5,000 poles, costing $5 each, in the ground fully equipped. Their original cost would be	$25,000
At the end of twelve years they will have to be renewed at a cost of	25,000
Interest for twelve years on the last $25,000, at 6 per cent, equals	18,000
Making a total cost for twenty-four years of	$68,000

Suppose we take the same plant and apply the treatment. Original cost of 5,000 poles	$25,000
Cost of sterilizing after they have been in the ground two years, at $1.25 each (and it can be done for less)	6,250
Interest on this amount for twenty-two years	8,250
Making a total cost for twenty-four years	$39,500

Comparing the cost of the two ways we have: Cost for twenty-four years without treatment	69,000
Cost for twenty-four years with treatment	39,500
Profit in favor of treatment	$28,500

It will be perceived that if the pole is preserved intact, with full strength for ten or twelve years, by means of the jacket and chemicals, and if the chemicals are removed or entirely gone at the end of that time, the pole will still be in the same condition to resist the fungi that it was when first treated, and will have its original strength and life.

Again in our calculations we have not taken into account the increased amount of trouble that always accompanies the use of old poles the last few years of their lives. This item of the maintenance account always increases as the poles grow older and weaker, and should be placed on the credit side where the process is used. Then again, in all human probability, poles

will be at least twenty-five per cent higher in value twelve years from this time. If that be the case, the cost of the new poles when they have to be renewed will be $6,250 more, and the interest on this increased amount for twelve years will be $4,500, making $10,750 more to be added to the profits of sterilizing, or a total of $39,350 in twenty-four years.

In all candor we ask of business men if this is not worth looking after?

At this point we wish to digress for a moment and allude to a condition of things in another branch of economics which will illustrate the present position of telephone and all other companies that use poles.

For hundreds of years there have been vast armies of soldiers raised to battle against each other in every so-called civilized country on the globe. Hundreds of thousands of soldiers have been killed in battle, but millions have died from disease. It has been recognized by the war departments of all nations, that for every soldier killed in battle, four have died from disease. In the Napoleonic wars this was true, in our Civil War, in the Franco-Prussian War, in the late Boer War it was true. In our Spanish War the proportion was much greater, there were 275 killed in battle and over 3,800 died from disease (nearly fourteen to one); and there are now 60,000 Spanish war veterans on the pension list, mostly from disease contracted in the war. In all these wars, very inadequate measures were adopted to prevent disease, and it was generally supposed by war-waging nations that this appalling death rate from disease was unavoidable.

It remained for the little known and little respected Japanese nation to grapple with and solve the problem. The leading officers and statesmen in Japan saw that if this great death rate could be stopped in their army, it would require a less number of soldiers, less transportation for them, less clothing, less food, and a vastly less expense to carry on a war. As one of their eminent physicians expressed it, "Because four soldiers have died of disease to one killed in battle in the past, is no reason that this terrible loss should continue forever." They enlisted the minds of their most eminent physicians and surgeons and bacteriologists to solve the problem. The result was that the military and scientific world has been astounded at their success. They have actually reversed the figures and, in the war just closed, four have been killed in battle to one that has died from disease, and this too without reference to the number engaged in battle.

The Japanese solved the problem by protecting their soldiers from the germs that caused the disease. Their food, drink, and clothing were all sterilized. Every surgical operation was carefully made with reference to protecting the diseased portions from the attacks of germs .

Are not the telegraph and telephone companies following blindly in the steps of the old warring nations? They have been taught and led to believe that the life of a pole is about twelve years; they have been taught to believe that the decay at the ground line is inevitable, and the time of its usefulness cannot be extended. We have demonstrated that the life of a pole can be nearly, if not quite, doubled by the use of the method of treatment here described.

I will add, that Dr. Howard Jones (my co-worker in these experiments) expects to publish at no distant day an account of his studies of the bacteria and fungi which cause the decay in telephone poles and fence posts. The scope and technical character of his experiments makes it impossible to give an account of them in this paper.

MARKING IN A WESTERN YELLOW PINE FOREST*

BY

M. B. Pratt, Forest Assistant, Tahoe National Forest

THE yellow pine type of the California Sierras is characterized by four principal species — yellow pine, sugar pine, incense cedar, and white fir. Variations occur at the lower limits, where spruce (*Pseudotsuga taxifolia*) comes in, and at the upper limits, where California red fir (*Abies magnifica*) is found. The type of forest treated of in this article is common at elevations ranging from 4,000 to 6,000 feet, and is readily distinguished from the white fir and sugar pine types which occupy the more sheltered slopes and better soils. The yellow pine type is commonly associated with the poorer soils, and exposed situations. Fir and cedar intermix somewhat with yellow pine on the drier soils, but generally prefer the moister gulleys and stream beds which are the favorite habitations of sugar pine, an associate less common than the others.

The yellow pine forest has been lumbered extensively for many years, the former practice being to take out only the pine and leave the inferior fir and cedar. In recent years, however, the dwindling supply of lumber and the high market price has led to the exploitation of the inferior species, so that at present every tree which will make a log is taken. Clean cutting is the rule, the trees that are too small for sawlogs being used for chute poles.

The system used by the Forest Service in the disposal of timber in National Forests offers marked contrast to the methods in vogue on private lands throughout the Sierras. A comparison of logged-over private and National Forest lands is striking, as respects both young growth and the condition of the ground. Instead of young pine girdled by chokers or broken-down by wire cables, there are thrifty poles and bunches of young growth unburied by piles of inflammable slashings. Scattered over the tract are thrifty pine seed-bearers, forming a nucleus for future crops. The results of forestry cannot help but be apparent to the most superficial observer as he glances on the adjoining denuded tract full of broken trees and covered with slashings.

The marking of the yellow pine type calls for a working knowledge of silvics coupled with good sense. The factors of the locality, as soil and moisture conditions have their effect upon the forester's judgment, but the views of the logging boss must also be considered. Theoretically, trees might be left which, practically, it would be impossible to leave because of their interference with logging operations, or the chances of their being broken by the felling of surrounding large trees.

There are several general considerations, however, which apply to the marking of this type wherever it is found. The points to be considered are as follows:

1. The period of time for which the marking is made.

2. The encouragement of the more valuable species.

*EDITOR'S NOTE.—The word marking as here used refers to the selection and marking of the individual trees which are to be felled. Such selection involves the treatment the forest is to receive in the future, and the date when the next succeeding crop of timber is expected to be cut.

3. The general condition of health.

4. The leaving of a nucleus sufficient to insure seeding and a future crop.

I. PERIOD OF TIME FOR WHICH THE MARKING IS MADE.

It is obvious that the marking of a tract for a period fifty years hence would be different from the marking of one for 25 years in the future. More regard would be paid to the leaving of trees for increment if there were prospects of logging being carried on again within the shorter period. The location of the tract has much to do with determining this feature of the marking. For instance, the timber on a tract of eighty acres in a National Forest was recently sold to a lumber company which owned timber on all sides. No other company will come in the locality after this timber, and it will be many years before the stripped lands of the present company will yield another crop. The Government timber will be isolated for a long period of years. Clearly marking would be heavier on such a tract than on a tract with ready means of access, or adjoining a merchantable body of timber.

The general age of the pine is another important factor affecting the marking. It would not be good policy to leave old trees or those on the decline, even though there was a scarcity of young timber, if it was evident that they would be dead or fallen by the time logging operations were next carried on. Such trees simply afford a home for insects and fungi, and are more of a detriment than a good to the forest as a whole. The patches of old timber are usually small in extent, and their removal can generally be compensated for by the leaving of groups of young timber on nearby spots. The varied ages found in the yellow pine type make a combination of the group and selection systems desirable.

II. THE ENCOURAGEMENT OF THE MORE VALUABLE SPECIES.

Yellow pine requires an abundance of light for its development. Young growth will do well in the shade afforded by chapparal, and ultimately will assume the ascendency, providing fire is kept out. Although most frequently found in soil with small humus content, yellow pine makes excellent growth on the more mesophytic sites. The best height and diameter development is found along streams and in gulleys where there are good moisture and soil conditions. The chief difficulty seems to be for yellow pine to get a foot hold in such situations, because of the tolerancy of shade shown by fir and cedar, which occupy the ground to the exclusion of yellow pine. In places, sugar pine establishes itself, although it is about as intolerant of shade as yellow pine, but not to any considerable extent. It is a species to be encouraged, while cedar and fir should be discouraged in as far as they occupy situations suited to pine. Fir lumber is inferior to that of pine, and cedar is usually too badly affected with dry-rot to be sawn even into timbers. By close marking of the inferior species, it is believed that pine can be made to occupy their places to a large extent.

III. THE GENERAL CONDITION OF HEALTH.

It is an easy matter to tell a thrifty pine by its smooth barks and symmetrical trunks. Mature and decadent trees are evidenced by thickly ridged bark, flat tops, hollowed out butts, and cancerous looking growths on the trunks. All such trees, as well as those showing signs of ill health by their yellow needles, are marked for cutting. Recent windfalls or large dead pine trees, which have not decayed too badly, are considered to contain merchantable lumber. Dead fir or cedar contains no merchantable lumber, but every live tree of these species which contains a log is marked for cutting.

Spruce is occasionally favored when it is evident that pine will not takes its place. This species may contain merchantable lumber even though it has defects which would render fir or cedar unmerchantable. Fir and cedar, intermixed with pine on the drier locations, are usually defective. Fir is attacked by a mistletoe and by fungi, while cedar is badly affected with dry-rot. Both species are very susceptible to fire, and rapidly deteriorate after being injured by it.

IV. LEAVING A NUCLEUS FOR SEEDING AND FOR A FUTURE CROP.

A study of the capabilities of a site for reproduction has much to do with the number of pine trees left on any tract. If it is well seeded, fewer trees will be left than if reproduction in sparse, or inferior species occupy the ground.

The general rule is to leave three or four thrifty pine trees per acre as evenly distributed as possible. More should be left if practicable, as there is danger of breakage from falling trees, or mistakes made by timber fellers in cutting unmarked trees. No diameter limit can be set for leaving pine, except that those which are left should be at least twenty inches and over in diameter. When thrifty groups occur, they should be left intact, as the taking out of one tree might destroy the compactness, and injure the effectiveness of the whole. In addition to careful marking and supervision, sheep should be excluded from all logged-over areas until young growth has had time to establish itself. With the keeping out of fire by efficient patrol, the forest will be in condition to renew itself for the better, and to produce crops of timber for posterity.

Burn in lodgepole pine forest on lower slope of Sleeping Cap Mountain—Shows reproduction of same species from cones on fire-killed trees

The Month in Government Forest Work.

The Tree for Indian Lodges

The lodgepole pine gained its name from its wide use by the Indians as a support for their tepees. Since the Indians of the Rocky Mountain region dragged their lodge poles to the plains when on hunting trips, a timber of requisite height but small diameter was sought, and this the lodgepole pine provided without trimming. The names of white pine, black pine, spruce, and tamarack are also applied locally. In Wyoming, lodgepole pine is more numerous than any other tree, and it is largely represented in the forests of Colorado, Utah, Montana, and Idaho, and to some extent in Washington, Oregon, and California. It grows from sea level to 11,000 feet elevation, and is noted for its variable form and quality. In the Rocky Mountains the wood is lighter in weight and color, less resinous, and straighter grained than on the Pacific coast.

A Good Tree After a Fire

Lodgepole pine attains an age of from 100 to 300 years. It quickly succumbs to fire on account of its thin bark, but to a certain extent guards against extinction by this cause by producing fertile cones at the early age of from 6 to 10 years. Reseeding after a fire is favored also by the persistence of the cones, some of which do not shed their seeds for a number of years, and by the readiness with which the seeds germinate on mineral soil of burned-over land. A large proportion of the seeds germinate; they are usually borne annually and in large quantities; and since they are small and light, they are carried by the wind as far as 200 yards from the seed tree.

Must Be Used Up Clean

Three of the largest timber sales of the Forest Service are of lodgepole pine. One of 165 million board feet is in the Medicine Bow National Forest on the Colorado-Wyoming line, and one of 50 million board feet in each the Big Horn Forest (in Wyoming) and the Hell Gate Forest (in Montana). In the Hell Gate sale the saw timber brings $4 per thousand and the converter poles 10 cents each. Cord wood is also included in the contract, so that every stick of the trees marked for removal down to 2 1-2 inches is taken. Utilization is almost as complete as in a German forest.

Comes in Handy in Many Ways

Thirty-eight years ago lodgepole pine was cut for railroad ties in southern Wyoming. Only the best trees were taken and the trees left are now of merchantable size. By the settlers, lodgepole pine is now used for many purposes, especially for house logs, fuel, and fencing. Because of its tendency to decay when set in the ground, fences are built on top of the ground and braced, thus increasing the life of the wood from 3 to 15 years. Preservative treatment is also being introduced, which will greatly enhance the value of the wood for posts, telephone poles, ties, and mine timbers. Railroad companies are already treating ties on a large scale at Laramie and Sheridan, Wyo.

Experiments on a large scale looking toward the use of lodgepole pine for paper pulp will be tried by the purchasers of timber from one of the National Forests.

A circular has been issued by the Forest Service on the growth of lodgepole pine. It grows a little larger and thicker in Montana than in Wyoming, being several feet higher on the average.

Views of this tree are given in the frontispiece of this issue, and on page 645.

The Forest Survey in Kentucky

The first season's field work in the co-operative investigation of the forest resources of Kentucky by the United States Forest Service and the State Board of Agriculture has just been completed.

Good progress has been made; all the territory drained by the Big Sandy and Little Sandy Rivers and Tygarts Creek has been covered, which includes the following counties: Pike, Letcher, Knott, Floyd, Martin, Johnson, Lawrence, Boyd, Greenup, Carter and Elliot. The work will be taken up again next spring and completed so far as the funds available will permit. The expense of the investigation is borne jointly by the Federal Government and the State, each appropriating $2,000.

The object of the study has been to determine the present timber supply, the rate of consumption, and other facts which may serve as a basis for suggestions and recommendations to be embodied in a report to the Kentucky legislature.

The investigation so far conducted has shown that within reasonable distance of railroads and floating streams there is very little good timber left, and yellow poplar is getting scarce all through the region. Ten years ago this tree was the most important one of the region, but now the cut of white oak exceeds it both in quantity and value. Many watersheds are practically devoid of merchantable timber, and many others are rapidly approaching this condition. Much of the land has been cleared for farming purposes, but owing to the steepness of the hills, which in many sections wash badly, and to the natural poverty of the soil, a large portion of the cleared land has been abandoned after raising a few crops of corn, and it is now growing up in briars and bushes, very slowly reverting to forest again.

This part of the State has a fairly thick population, and the people depend to a large extent on the marketing and manufacture of the timber for a livelihood. It is therefore highly important, not so much that the timber itself should be preserved, but that the forest lands should be so handled that a perpetual supply of timber may be expected.

Electric Power in the Cascades

Permit has been granted to the Southern Pacific Company to build a power house and conduits in the Cascade National Forest in Oregon. This is taken by some of the press to mean that the power may be used for equipping electrically the Pacific railroads, which was earlier said to be the purpose of Mr. Harriman. But this "Southern Pacific Company" is not a railroad company, and it is not connected with the Southern Pacific Railroad, so far as the authorities know.

Larger Reserves in California

The President has signed proclamations adding 480,451 acres to the Stanislaus and Lassen Peak National Forests in California.

The addition to the Stanislaus is in Calaveras, Tuolumne, and Mariposa Counties, and takes in a strip of land fifty-five miles long and covering 348,570 acres.

In the northern part of the addition is the famous Calaveras grove of big trees. This grove is owned privately, but there are other smaller groves adjacent to this, and there has long been talk of the Government purchasing the patented land and establishing a National Park.

Supervisors Returning to the Field Two of the district foresters, Mr. Ross McMillan and Col. Willis M. Slosson, are going back soon to their forests. It is the custom of the Forest Service to have the supervisors of the various forests come into the Washington office in rotation for a few months at a time, and take a hand in the general administration of the Service. Six are in Washington at a time, each being designated for one of the large districts into which the country is divided. By their Washington experience these gentlemen become familiar with the headquarters end of the forest administration, and at the same time enrich the central office with suggestions from their experience and from new personal points of view.

Alamogordo Timber Land Case The Alamogordo Lumber Company case is one of the most complicated that has ever had to be considered by any of the departments at Washington. It involves land given by the United States to the Territory of New Mexico, and afterwards sold by the Territory in a manner contrary, as the Government holds, to the conditions of the gift. The *Wall Street Journal* makes the following statement relative to the present status of the case. It is a curious and interesting incident, if land that has been alienated is conveyed back to the Government to be converted into a National Forest:

"The suit by the United States Government against the Alamogordo Lumber Company, controlled by the Phelps-Dodge interests, to revoke the sale of 20,000 acres of timber land made to it, and enjoin it from cutting any timber on the tract, may be settled out of court. Hearing of the application for an injunction has been postponed pending negotiations for an amicable settlement.

"It is stated by the company that it has never cut any timber from the tract, which is purchased from the Government at $3 per acre; and that its operations have been confined to 30,000 acres acquired with Government land script, concerning which there is no contest.

"The company has made a proposition to the Government to deed over all land previously cut in order that it may be reforested, and to cut on the 20,000 acres in question only such timber as Government foresters shall decide should be cut, and when the commercial timber shall have been cut the land shall be deeded back to the Government for a National Forest. It is stated that this proposition was made before the suit was filed, and that it meets with favor by the Forestry Bureau. It is understood that the postponement of the case is that further consideration of the proposition may be given by the Government.

"There is no foundation for the report that the forest reservation at Cloudcroft, in the Sacramento Mountains, is involved in the suit, and nothing but the 20,000 acres, which are still in their virgin state, are sought to be recovered by the Government."

Using More of the Tree's Bulk Less than 50 per cent of the average tree, as it stands in the woods, comes into the market in the form of valuable products. Under methods heretofore in practice only that much of the tree was considered useful. Newer methods are utilizing more and more of what was formerly thrown away; and the Forest Service is continually making experiments and investigations to render possible a still greater economy.

Feeling the Inside of a Log An ingenious device used in the Forest Service enables the experimenters to know how long it takes heat to penetrate to the heart of timber. Electric wires are sunk to various depths in the wood and the heat causes electric connection which rings a series of bells.

Government Irrigation Work During the Month.

Arguments For Drainage

According to the bill introduced by Senator Flint creating a fund for the drainage of swamps, the work is to be done under the direction of the Secretary of the Interior; and this means by the Reclamation Service. Two representatives of the Reclamation Service and one or more of the Geological Survey are on the program at Baltimore, in the meeting just held. These facts render it appropriate to give in this department of FORESTRY AND IRRIGATION some of the arguments set forth by the National Drainage Association in favor of their proposition.

The average cost of drainage would be about $5 per acre, and the land when reclaimed by drainage is as valuable as the land when reclaimed by irrigation.

Engineers report that there is more land to be reclaimed by drainage than there is to be reclaimed by irrigation.

The geography of the country and the location of the drainage lands show that they are nearer to the markets for the products of intensive farming than are the lands to be reclaimed by irrigation.

It is safe to say that to reclaim the 50,000,000 acres of land by drainage will increase the land values of the drainage districts more than $5,000,000,000, and will increase the crop values of the section more than $1,500,000,000.

If it is possible to subdivide this enormous area into 40-acre farms, it will supply 2,500,000 families with homes, and it will put 12,000,000 people upon the lands that are now practically worthless. It is safe to say that those families will spend $2,000 in houses and equipments and improvements for their farms. This will cause an expenditure on the waste lands of to-day of more than $5,000,000,000. An average family of five will spend $600 per year. That will mean to the business interests an increased trade of $1,500,000,000 over what is now enjoyed.

Buyers for these lands on the intensive farming plan are increasing every year, not only by the natural increase of native born, but by addition of 1,000,000 foreigners annually, who must be provided with homes. We are not making more land, but the population is constantly growing more and more and the demand for land is growing greater and greater.

Drainage in Illinois

The advisability of systematically draining swamp and overflow lands is nowhere more forcibly illustrated than in the State of Illinois. Some 2,000,000 acres of swamp and overflow lands still remain within the limits of the State, although much has already been done by private enterprise in draining. An immense amount of land of little value has been raised to high value. In the early settlement of the State large sections of marshy land sold at auction for 8 1-3 to 12 1-2 cents an acre, which is now worth more than $150 an acre. As recently as 1880 large areas in the central part of the State were sold at $20 to $25 an acre.

To Irrigate 25,000 Acres

One of the new Texas irrigation projects is that of the Wharton Irrigation Co., which will locate its plant on the Colorado River two miles west of Wharton, Texas, and proposes eventually to water 25,000 acres of land. The undertaking of a proposition of this extent is significant of the development which may be expected in the rice industry in Texas. Mr. John W. Maxcy of Houston is the consulting engineer in charge, and according to the present plan fifteen miles of main canal will be constructed this year, or before the time for watering next season's crop. This, with the lateral canals, will irrigate from 10,000 to 12,000 acres of land.

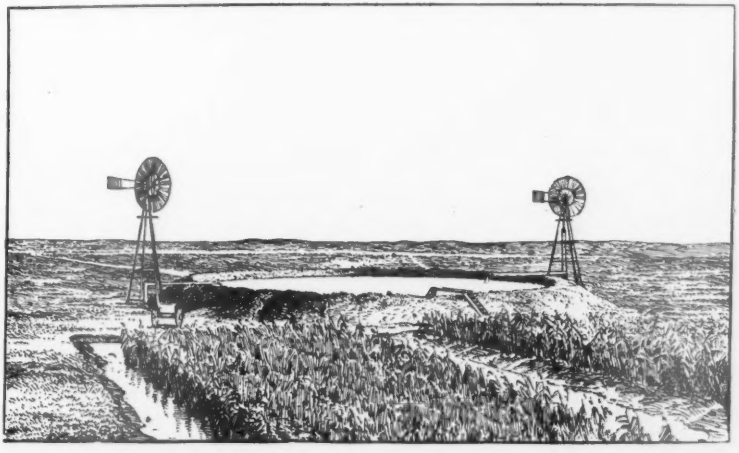
The Chandler Water Company proposes to construct a reservoir to hold 4,502,800 cubic feet of water, which will be taken from the flowing artesian wells near Chandler, Colorado, and which will be used for irrigation next spring. The reservoir will be eighty feet deep and 200 feet long. Any water in excess of that required for irrigation will be used for power purposes.

The Union Irrigation Company has completed financial arrangements, it is stated, for construction of its canal near Opelousas, La., and proposes to begin work at once. The initial canal installation will be sufficient to irrigate 30,000 acres. The discharge basin or beginning of the main canal will be located seventy-five feet above Gulf level, and will make it possible to irrigate eventually 1,500,000 acres.

Mr. J. Franklin Schell, manager of this enterprise, conducted one hundred Germans from Lancaster County, Pa., to Opelousas, Louisiana, with a view to securing them as settlers and investors. These Germans, who have made Lancaster County a model and wealthy farming community, will be a splendid addition to Louisiana.

Parties at Beaumont, Texas, have purchased 8,000 acres of land in Hidalgo County for $200,000, and propose to establish a plant which will irrigate this 8,000 acres, and 12,000 acres owned by the La Blanca Agricultural Company. They also contemplate establishing a sugar mill.

Swanson & Company, of Brownsville, Texas, will develop about 8,000 acres of land on the Rio Grande river, about four miles from Brownsville. It is proposed to divide the land into small farms devoted to the culture of cane, cotton and corn.



WITH MEMBERS AND CORRESPONDENTS

What Will We Do This Afternoon? Col. A. H. Winchester, of Buckhannon, West Virginia, a prominent lumberman and official of the Lumbermen's National Association, is a member of the American Forestry Association, as all lumbermen ought to be. At a visit to the office the other day, Colonel Winchester said that we all know there is going to be a lumber famine tomorrow, but he could not see what we are going to do this afternoon for tan-bark and for turpentine. In this connection he was interested to see the report from the Philippine Islands about the manufacture of tannin extract there; but remarked that it was a curious thing we should now be going to the other side of the earth for a product which only a few years ago was found in such abundance all around us.

Farmers' Institute Work Professor J. E. Maxwell, Leander Clark College, Toledo, Iowa, writes for suggestions regarding lantern slides to use in bringing out the subject of forestry in his addresses to farmers' institutes. This is a good thing. Farmers have need of forestry knowledge, and many of them desire to obtain it. Farmers' institutes ought to give widespread information about this most important crop—timber.

Citizens Mindful of Their Duty Rev. Dr. Ladd, Rector of Grace Church, Jamaica, N. Y., writes: "No consideration of greed should be allowed to interfere with our possession of one of the grandest features and resources of our beloved country. Yet it will require an unremitted and courageous effort to withstand and expose to condemnation the crafty and dishonest measures to which these robbers of the Nation will ever resort. I have watched them in the Southwest with great indignation."

A Chance for the Next Generation Mr. H. D. Bush of the Baltimore Bridge Company asks us: "Did you ever look into the practical preservation of forests as practiced around New Bedford, Massachusetts? They cut small trees there 8 to 10 inches for box boards for the cotton mills. Each generation cuts the large trees, and leaves the small ones to grow up for the next generation."

A State Forester Needed An officer of the Colorado Forestry Association, Mr. Irving Hale, of Denver, in becoming a member of this Association also, writes: "I am deeply interested in this important question of forestry, being a member of the executive committee of the Colorado Forestry Association and chairman of the forestry committee of the Denver Chamber of Commerce; in connection with which we are trying to secure legislation to establish a State Forestry Bureau and Forester, with a view to the preservation, reforestation, and utilization of our forests, which is becoming a vital problem with reference to our timber supply and especially the conservation of rain and snow for irrigation."

There should, no doubt, be a State Forester in a State which has as much at stake as Colorado, where farming is a large interest and nearly all of it is done by irrigation.

A Good Sized Elm An elm tree cut up at Forestville, Minn., yielded 4,482 feet of lumber and six loads of stove wood. Rings showed it to be 320 years old.

The Wisconsin newspapers claim that an elm in that State is one of the largest in the United States. It measures 11 feet, 11 inches girth.

There is an elm in Westport, N. Y., at the home of Mr. Wm. D. Marks, a member of the American Forestry Association, having a girth of 14 feet, 8 inches just below the first branch. Mr. Marks thinks it would be hard to find a larger elm anywhere.

A Manual of the North American Gymnosperms. By David Pearce Penhallow, D. Sc., MacDonald Professor of Botany, McGill University. Ginn & Company, publishers, Boston.

Among recent botanical works of scientific character none is of such an absorbing interest to the forester as Professor Penhallow's Manual of the North American Gymnosperms. The object of the author was to prepare a classification of all the now existing and fossil coniferous trees, on the basis of the minute anatomical structure of their wood. The need of such means of identification of tree species is apparent. Engineers are often called upon to recognize species of wood that enter into the construction of a bridge or other works, and since there are no flowers, fruits, or leaves to go by, the anatomical structure of the wood is the only feature by which it can be identified. Such classifications, besides being of great practical utility, are indispensable in paleo-botanical research work, since they allow one to identify the species of the genus by the structure of the wood, which as a rule can be readily recognized in fossil trunks, and thus establish the relationship between the now existing species or genera and those which existed before.

Identifications of species by the use of the structure of their wood are not new. Nordlinger, Hartig, and Muller prepared such classifications for some of the European species, while in this country, in Bulletin 10 of the Division of Forestry, F. Roth attempted to apply the anatomical structure of the wood to the identification of the American species, but no one has attempted to make the classifications so inclusive and complete as does Professor Penhallow. The book must be classed as an epoch-making one. It consumed nearly twenty-seven years of the author's life in its preparation.

The book consists of two parts. The first deals with the description of the minute anatomy of the wood; the other, the more technical, comprises the classification of the species. The first part contains also a chapter on durability and a chapter on the decay of wood, which, although very interesting, are not entirely pertinent, in our opinion, to the main subject. The book should be read by every forester.

R. Z.

The Utilization of Wood Waste by Distillation. By Walter B. Harper, M. S., of the Louisiana State University. Published by the St. Louis Lumberman. 150 pp. 74 illustrations.

The appearance of a book on this subject is very timely; the interest in wood distillation has become so great, and the information on the subject has been so scarce, that a treatise in English is much needed. The book is intended to aid in the establishment and conduct of wood distilling enterprises on a business basis. The author has had extended experience in the management of pine distillation plants, and writes from a full practical knowledge. Doubtless it is this personal interest that has caused him to limit the work to treatment of longleaf southern pine, and mention the hardwood distillation industry only casually.

The earlier chapters give a historical account, the elementary principles involved, and the apparatus and methods now in use. It is unfortunate that no description is given of a modern column still head such as is used in wood alcohol refining. In Chapter VI, patented apparatus and processes are discussed. In this the inventors' claims are set forth in such detail that it is often difficult to know whether the author's opinion corroborates these claims or not. Too much space is given to this feature, and the numbers of the cuts used for illustration, taken from patent specifications, do not always agree with the numbers assigned in this book. As a review of patent literature on this subject, however, the chapter is good.

Chapter VII, on the execution of the processes of wood distillation, gives a very good discussion of the practical points to be observed in running a

charge (1) by steam distillation, (2) by combined steam and destructive, (3) by destructive distillation alone, and (4) by a special retort process. This chapter also describes methods of making wood gas for illuminating purposes and for use in gas engines. In Chapter VIII, on refining processes, Mallonee's, Gilmer's, and Herber's patented processes are given as per specification without discussion.

The cream of the whole book is contained in Chapter IX, "General Considerations for the Establishment of a Plant." This is just the kind of information which has been wanted by owners of raw material who wished to know the actual and technical business details to be considered before going into the wood distillation business. The discussion of the relative merits of the different general processes is especially good; and the description of the little difficulties to be overcome and the changes of manipulation necessary with different methods are of great value to present and prospective operators. The estimates of cost of operation are conservative, and are probably as accurate as estimates can be. This chapter should be read by every one intending to enter the pine-wood distillation business.

Wood Distillation. Circular 114, Forest Service. Designed to answer the many inquiries received regarding the distillation of hardwoods and softwoods, and the products obtained.

Prolonging the Life of Mine Timbers. Circular 111, Forest Service. In the cost of mining anthracite, timber is a large element. This publication discusses factors destructive to mine timber, experiments in various treatments to render it more durable, and a timber policy which will render possible successful treatment. Mining companies should purchase and operate tracts of timberland.

Lining the Ditches and Reservoirs to Prevent Seepage Losses. Bulletin No. 188, California Experiment Station. By Elwood Mead and B. A. Etcheverry. The water which sinks into the soil from ditches and reservoirs is one of the chief sources of waste in irrigation, in some soils amounting to more than half of the total flow. In lateral ditches cement lining is too costly. The bulletin describes investigations of lining methods already practiced, and experiments to determine the efficiency of different kinds. Stones, oil, clay puddle, and concrete are the principal means used. There are advantages from lining canals besides prevention of leakage.

Swamp and Overflowed Lands in the United States; Ownership and Reclamation. By J. O. Wright, supervising drainage engineer. Circular 76. Office of Experiment Stations.

List of Publications of the Office of Experiment Stations on Irrigation and Drainage. Corrected to October 1, 1907. Document 1046, same office.

Forest Service, New Publications:

Circular 61 (Revised Edition). How to Transplant Forest Trees.

Circular 114. Wood Distillation.

Circular 119. Consumption of Tanbark and Tanning Extract in 1906.

Circular 120. Consumption of Pulpwood in 1906.

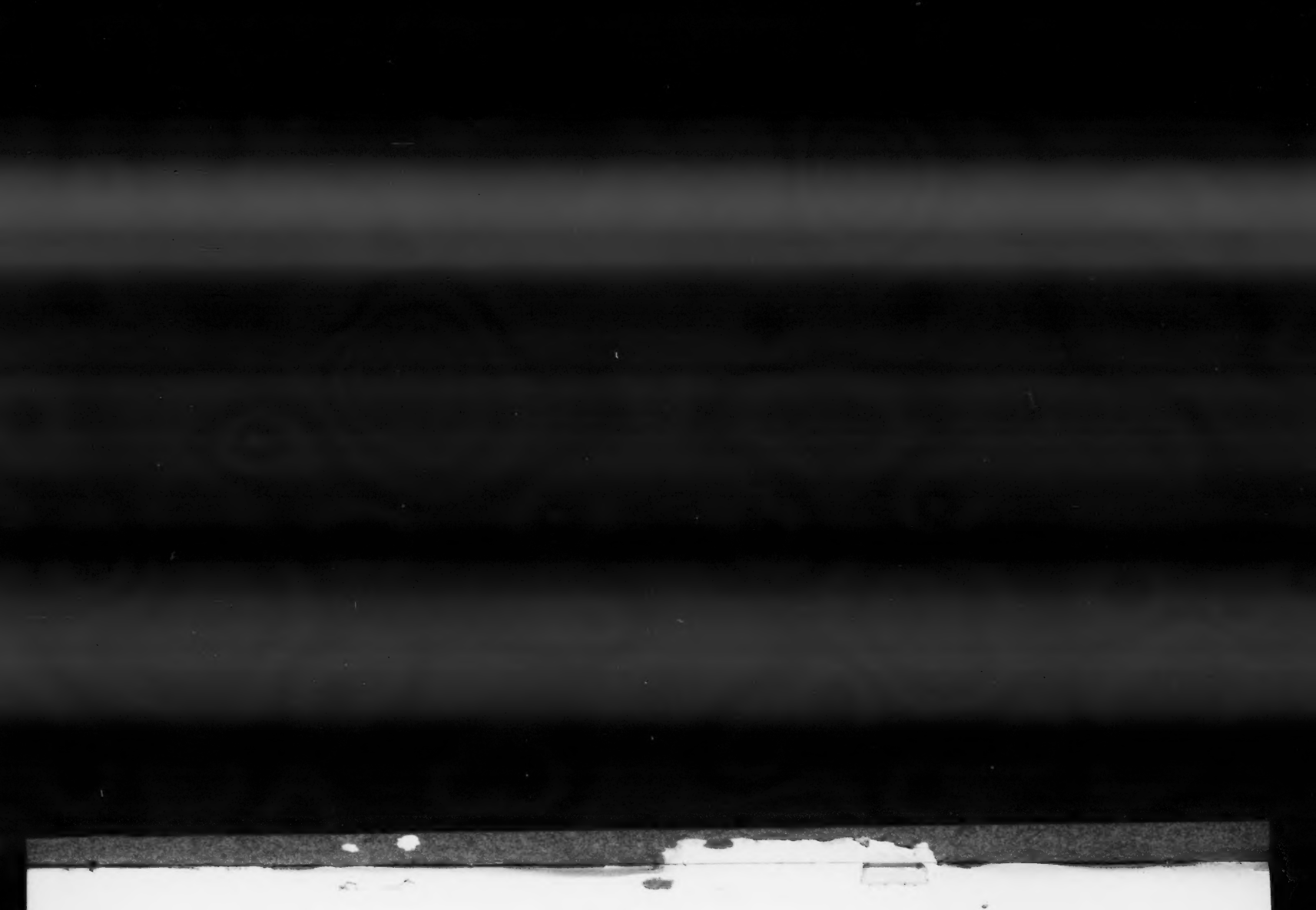
Circular 126. Forest Tables—Lodgepole Pine.

Circular 129. The Drain Upon the Forests.

Unnumbered Circular. Suggestions for the Disposal of Brush in the National Forests.

The Citrograph, Redlands, California, is a local paper which is earnest in the cause of forestry. At frequent intervals it has long articles of value from various sources, often illustrated, on forestry questions, and its circulation must do much to popularize this movement in the sphere of its influence.

The American Fruit and Nut Journal has brought out a miniature edition which is a likeness in half-size of its regular edition. The miniature contains many interesting articles on pecans, walnuts, peanuts, persimmons, and other fruits and nuts. If the miniature is a sample of the regular publication it is an interesting paper.



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